BC Energy Step Code Metrics Report Update

Presented to:

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Province of BC

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Executive Summary

The BC Energy Step Code is currently an optional compliance path in the BC Building Code (BCBC) that local governments may use, if they wish, to incentivize or require a level of energy efficiency in new construction where higher Steps go above and beyond the requirements of the base BC Building Code. Projects may voluntarily use the BC Energy Step Code as a compliance path for meeting the energy efficiency requirements of the BC Building Code.

In keeping with the federal government's Build Smart: Canada's Buildings Strategy, the Province has committed to having a net-zero energy ready standard for new construction by 2032. This change will be enacted step by step through the BC Building Code. Compared to the 2018 base BC Building Code, new homes and buildings will be:

20% more energy efficient by 2022

40% more energy efficient by 2027

80% more energy efficient by 2032 – the net zero energy ready standard

This study updates and expands on previous work completed in the 2017 and 2018 Metrics Research Reports, with a focus on updating analysis that will determine appropriate energy efficiency requirements to include in BCBC 2022 given the CleanBC commitment to shift to a new baseline that is approximately 20% better than BCBC 2018, as well as providing a consistent set of greenhouse gas emission related targets. The study also conducts an overheating risk analysis using current and future typical weather data.

Archetype energy modelling is used for a number of Part 9 and Part 3 building types.

For Part 3 buildings, a shift to Step 2 as the minimum Step for all modeled archetypes is recommended; this generally fulfills both the need for the new baseline to meet NECB 2020 as well as to be approximately 20% better than BCBC 2018.

Overheating risk analysis is conducted for Part 3 multi-unit residential buildings, and identifies a number of passive cooling measures that can be combined to achieve targets of under 200 hours overheated, aligned with the City of Vancouver Energy Modelling Guidelines v2 targets, with the exception of the climate zone 5 location modeled (Kamloops) which is not able to meet this target based on the modelling conducted due to hotter typical summer weather. The analysis identifies challenges with meeting a 20-hour target for vulnerable populations even in 2020's projected weather files, with only climate zone 4 able to meet this target based on the measures modeled. In addition, future-projected 2050s weather was analyzed and shows considerable warming and increased overheated hours.

The overheating risk analysis also notes significant limitations with passive cooling measures in extreme weather events including life safety issues such as those seen in the heat dome in 2021. These events are not accounted for in even future-projected energy modelling weather files. Both passive and active cooling measures should be considered in combination to reduce risk and improve resilience.

Greenhouse gas emission targets are proposed for both Part 9 and Part 3 buildings. In both cases, three levels are proposed, with “medium” targets intended to require one significant decarbonization measure, “low” targets to require decarbonization of all major systems but allowing for some backup heating or auxiliary uses such as cooking, and “zero carbon ready” to require full decarbonization.

For Part 9 buildings, analysis of the new laneway home archetype shows that to achieve the same Step level as larger homes, additional energy conservation measures are required, and these represent a larger percentage of the overall project cost.

Analysis of variations of window to wall ratio as well as surface area ratio for the medium and large single family dwelling show that both can have a significant energy impact and require additional energy conservation measures (and associated costs) to maintain performance. Both are typically design choices, where the increased energy use can be compensated for with other design measures. However a minimum level of articulation, for example, may be required by some jurisdictions. Jurisdictions adopting the BC Energy Step Code should consider their other policies for alignment with Step Code goals.

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List of Abbreviations

ACH: Air changes per hour

AFUE: Annual fuel utilization efficiency

ASHP / CCASHP : Air-source heat pump / cold-climate air-source heat pump

BCBC: British Columbia Building Code

Cfm: Cubic feet per minute

COP: Coefficient of performance

CoV EMGv2: City of Vancouver Energy Modelling Guidelines version 2

CZ: Climate zone

DHW: Domestic hot water

DOAS: Dedicated outdoor air system

ECM: Energy conservation measure

Elec: Electricity

ERS: EnerGuide Rating System

FC: Fan coil

GHG / GHGI: Greenhouse gas emissions / greenhouse gas emissions intensity

HP: Heat pump

HRV / ERV: Heat recovery ventilator / energy recovery ventilator

HSPF: Heating seasonal performance factor for heat pumps

HTAP: Housing Technology Assessment Platform

HVAC: Heating, ventilation, and air conditioning

ICC: Incremental capital cost

LEEP: Local Energy Efficiency Partnerships

LPD: Lighting power density

MEUI: Mechanical energy use intensity

MURB: Multi-unit residential building

NECB: National Energy Code for Buildings

NG / RNG: Natural gas / renewable natural gas

NPV: Net present value

PV: Photovoltaic

RTU: Rooftop unit

SHGC: Solar heat gain coefficient

TEDI: Thermal energy demand intensity

TEUI: Total energy use intensity

VAV: Variable air volume (as a mechanical system)

VRF: Variable refrigerant flow

WWR: Window to wall ratio

1 Introduction

The BC Energy Step Code is currently an optional compliance path in the BC Building Code (BCBC) that local governments may use, if they wish, to incentivize or require a level of energy efficiency in new construction where higher Steps go above and beyond the requirements of the base BC Building Code. Projects may voluntarily use the BC Energy Step Code as a compliance path for meeting the energy efficiency requirements of the BC Building Code.

In keeping with the federal government's Build Smart: Canada's Buildings Strategy and the Pan-Canadian Framework on Clean Growth and Climate Change, the Province has committed to having a net-zero energy ready standard for new construction by 2032. This change will be enacted step by step through the BC Building Code. Compared to the 2018 base BC Building Code, new homes and buildings will be:

20% more energy efficient by 2022

40% more energy efficient by 2027

80% more energy efficient by 2032 – the net zero energy ready standard

This study updates and expands on previous work completed in the 2017 and 2018 Metrics Research Reports, with a focus on updating analysis that will determine appropriate energy efficiency requirements to include in BCBC 2022 given the CleanBC commitment to shift to a new baseline that is approximately 20% better than BCBC 2018, as well as providing a consistent set of greenhouse gas emission related targets to be applied by local governments. The study also conducts an overheating risk analysis using current and future typical weather data.

The study uses energy modelling and cost data to examine the costs associated with achieving the proposed metrics, and to obtain optimized costing results for two primary metrics: incremental capital costs, net present value (NPV) as well as a focus on carbon abatement costs. The study also examines the potential impacts of greenhouse gas emissions targets and conducts an overheating risk analysis.

In addition, analysis has been expanded to add a smaller/laneway house for Part 9, and to add analysis on window to wall ratio and form factor for Part 9.

The current targets of the BC Energy Step Code are available in Sections 9.36.6 and 10.2 of the 2018 BC Building Code, available online via https://bccodes.ca/index.html.

1.1 Team

All analysis was conducted by Evoke Buildings Engineering and E3 Eco Group.

1.2 Limitations

- The study is limited to the particular archetypes and measures studied.

  - It is not intended as a design guide. The study includes a limited number of scenarios, and it is unlikely any single building design will fully match archetype inputs or results.
  - Variations in size as well as shapes of buildings can have significant impacts and are not considered for all archetypes. Small, narrow, or particularly complex buildings are likely to require different approaches.

- Part 9: surface area ratio and window to wall ratio variations were considered only for medium and large single family dwellings within this study.
- Costing information is high level and is expected to vary by project. Costs exclude incentives.
- The study focusses on new construction only; existing buildings are not considered.
- Upcoming changes to the code may reference ANSI/ASHRAE Standard 62.1-2016: Ventilation for Acceptable Indoor Air Quality, rather than the currently referenced ASHRAE 62.1-2001 without Addendum N. This change would be significant and would impact energy. The proposed new ASHRAE 62.1-2016 ventilation rates are modelled throughout this study. Individual projects would be expected to model ventilation rates as-designed, which may be higher than the code minimum requirement and may require additional energy conservation measures to achieve targets.
- District energy has not been evaluated within this study. There are a large number of possible designs and compliance treatments for district energy and it has been excluded from this analysis.
- Overheating:
  - Overheating is a life safety issue and should be looked at in a broader context to develop adequate regulations.
  - Only Part 3 MURBs have been considered in the overheating analysis. Part 9 modelling software does not have adequate overheating analysis capabilities. Part 3 commercial buildings typically have mechanical cooling measures and would be expected to conduct in-depth analysis of any passive or hybrid cooling measures used.
  - Weather files consider only typical weather years. They do not consider extreme weather events, including heat waves. These are times when passive cooling measures may not function as well due to high outdoor air temperatures or wildfire smoke. Extreme weather events are expected to increase in severity and frequency as climate change continues.
  - Temperature limits are based on ASHRAE 80% Acceptability Limits, although they are simplified compared with the full standard to allow for more straightforward integration with energy modelling software and workflows to provide a first

order analysis. However the use of 80% acceptability limits is itself a limitation of the analysis. Thermal comfort is highly variable depending on individual needs and preferences, and the 80% acceptability limit intends only to satisfy 80% of occupants, potentially leaving 1 in every 5 occupants in uncomfortable conditions even when the standard is met.

        - In addition, the 80% acceptability limits are only applicable for systems where the following conditions are true: (a) There is no mechanical cooling system installed. No heating system is in operation; (b) Metabolic rates ranging from 1.0 to 1.3 met; and (c) Occupants are free to adapt their clothing to the indoor and/or outdoor thermal conditions within a range at least as wide as 0.5-1.0 clo. (Source: CBE Thermal Comfort Tool for ASHRAE-55 (berkeley.edu)). In general this is expected to apply to the MURBs considered in this study; however should be noted as a limitation.

    - Energy modelling software has limitations in relation to overheating risk. EnergyPlus was used in this study, and notably only has a single temperature node within each zone. It does not account for differentials within the zone, or for local discomfort effects.

    - The archetype analysis workflow has limitations in terms of overheating risk analysis. The model uses a single zone per elevation, which may not represent a worst-case scenario for overheating. One possible worst-case may be a very narrow and deep single-façade suite with little opportunity for cross-flow ventilation, or a southwest-facing corner suite with high solar gains. This archetype is used to align with the remainder of the study as well as previous Metrics Report studies. Projects will need to conduct individual analysis specific to their layouts and design strategies.

    - Variations in suite internal loads are not considered within the scope of this study.

    - Radiant temperature is not considered, and dry bulb temperature only is used in the analysis. Some energy modelling programs may be able to consider radiant temperature, however a survey may need to be undertaken to confirm that there is sufficient software capability of considering radiant temperature if doing so were to be required.

- It cannot be said with 100% confidence that all designs meeting Step 2 would meet NECB 2020; this is true of current Step Code targets as well and becomes increasingly true as stringency of the base code increases. This is the nature of comparing absolute and baseline targets. Size and shape of the building are significant energy inputs that are equalized in a baseline model but for which credit or penalty is seen in an absolute target. In addition, certain characteristics of the baseline are dependent on the design,

and may lead to savings against the baseline even while increasing the absolute energy use of the building, or vice-versa.

2 Energy Modelling

An energy modelling analysis has been completed, using archetype buildings developed to represent buildings commonly seen within BC. Both Part 9 (small residential) and Part 3 (large residential and commercial) building types are considered. Cost data has also been gathered from previous studies, local contractors, suppliers, and consultants, and cost databases. Combined with energy model results, this has been used to study incremental capital cost, net present value, and greenhouse gas emissions abatement costs of energy conservation measures examined in the study.

2.1 Part 3 Archetypes

The same building archetypes as used for the original 2017 and 2018 reports were maintained, with changes to models as outlined in this report. The models are developed using EnergyPlus v9.4, and, as was done in 2017 and 2018, the models have been run using a parametric energy modelling tool to simulate a large number of models within a given range of input variations. The parametric runs, for example, can vary the wall R-value, window U-value, and window to wall ratio, one at a time and in combination to see potential impacts. The ECMs and variations simulated are listed in Section 2.1.3.

The archetypes are outlined in the table below. More information is available in Appendix A.

Table 2-1. Archetype descriptions for Part 3

Archetype	Description
High Rise MURB	28-storey high-rise MURB, non-combustible construction Modeled as one zone per façade, with interior core corridor space. Small amenity space, no significant amenity loads (e.g. pools etc).
Low Rise MURB	6-storey wood frame MURB. Same zoning and amenity space as high-rise MURB.
Office	10-storey office building, modeled using core and perimeter zoning.
Retail	Big box and mall options simulated, both single storey with core and perimeter zoning.
Hotel	10-storey hotel including conference areas, pool, and commercial kitchen and laundry, as well as guest suites.

The energy results for the high-rise and low-rise (6-storey) Part 3 MURBs are the same on a per area basis; i.e. they are held to the same standard. However, certain energy conservation measures may be more readily applicable to a low-rise wood framed MURB, such as drainwater heat recovery and higher thermal performance envelope. The costs for measures differ, as we look at wood frame construction for the low-rise MURB and non-combustible construction for the high-rise MURB. Where energy results only are discussed, we roll both discussions together.

2.1.1 NECB 2020

A new edition of the National Energy Code for Buildings, NECB 2020, is forthcoming. With the energy requirements of NECB soon to be updated, this could potentially lead to changes in the BC Building Code, if NECB 2020 becomes the adopted edition of NECB within the BC Building Code. In addition to referencing NECB as Step 1 for applicable Part 3 buildings, the BC Energy Step Code also contains absolute targets for TEUI and TEDI. With a potential update of the BC Building Code to NECB 2020, the absolute TEUI and TEDI targets, or the minimum Step level, may require updates to maintain the relative performance of the higher Steps.

The relevant updates within NECB 2020 are outlined below.

BCBC 2018, which is in force at the time of writing, references NECB 2015. An interim version, NECB 2017, has also been published, and any changes implemented between the currently referenced NECB 2015 and the future NECB 2020, must be modeled. This is discussed further below.

NECB applies to Part 3, though can be applied to Part 9 buildings as well. The Part 9 simulations in this report do not reference NECB.

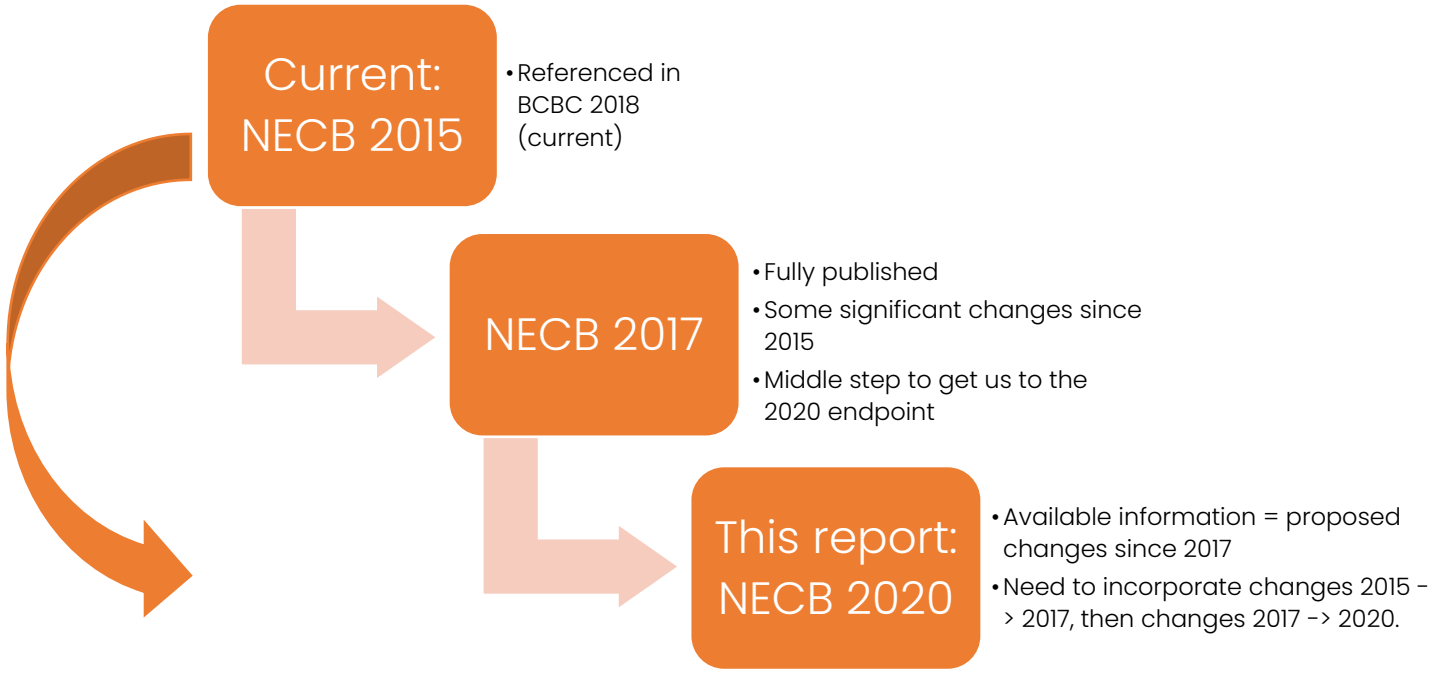
NECB 2020 is not yet published as of the date of this report; as such the modelling is based on the proposed changes, summarized below, as of April 22, 2021.

Table 2-2. Summary of proposed changes in NECB 2020

Proposed Change	Subject	Title	Impact on Modelling Study
1414	Air Leakage	Whole Building Airtightness Testing	None - using CoV modelling guidelines to evaluate airtightness targets, and testing is already required.
1435	Piping and Duct Insulation	Piping Insulation	None - no losses in model; no change to Part 8
1438	Piping and Duct Insulation	Duct and Plenum Insulation	None - no losses in model; no change to Part 8
1456	Interior Lighting Power	Lighting Power Density Improvement - Interior Lighting	Yes - reduced lighting power density per updated tables
1458	Exterior Lighting Power	Treatment of Exterior Applications Currently Not Covered in NECB	None - Exterior lighting allowance only; no savings/particular design modeled.
1460	HVAC Trade-off Path	Deletion of Part 5 and Part 6 Tradeoff Paths	None - following Part 8 (Performance Path)
1527	Performance Compliance - Other	Tiered Energy Performance Compliance	None - Step Code will set its own tiered targets.
1536	Building Envelope - General	Thermal Characteristics of Fenestration and Doors	Yes - improved thermal performance per updated table. Fenestration improvement was approved, doors remain per NECB 2017.
1537	Building Envelope - General	Thermal Characteristics of Opaque Building Assemblies	Yes - improved thermal performance per updated table.

Proposed Change	Subject	Title	Impact on Modelling Study
1549	HVAC - Other	Supply Air Systems	Yes - set zone min airflow for VAV to 30% or OA, and use warmest reset
1621	HVAC Equipment Efficiency Table	HVAC Equipment Performance Requirements	Yes - improved performance per updated table.
1623	Climatic Loads	Update of Wind Pressure Data	No - model sizing based on CWEC 2016 weather files and design days.
1630	Service Water Heating Equipment Efficiency Table	Service Water Heating Equipment Performance Requirements	Yes - improved performance per updated table.

In addition to the changes noted above, which are the proposed changes from NECB 2017 to 2020, the models must also take into account the updates between NECB 2015 (currently referenced by BCBC) to NECB 2017. Changes from the current BCBC 2018 (NECB 2015) up to 2020 should all be accounted for. The models must, in essence, go through NECB 2017 to get to NECB 2020 because the only publication relating to NECB 2020 available at the time of writing are the proposed changes since NECB 2017.



Envelope in NECB 2017/2020

One significant change that occurred between NECB 2015 and current editions is the inclusion of additional thermal bridging elements in the calculation of envelope thermal performance. An NECB 2015 compliant wall may have a clear wall performance of, say, R-18 (for climate zone 4) but would not be required to account for certain elements of thermal bridging, such as window transitions. This would lead to that R-18 compliant wall having an actual effective R-value closer to, say, R-10 (depending on details).

As of NECB 2017, and carrying through to NECB 2020, the standard requires a more complete evaluation of envelope thermal performance and the impacts of thermal bridging. Therefore, an R-19.6 wall (NECB 2020 for climate zone 4), must, essentially, have an effective performance of R-19.6.

What looks like an increase from R-18 to R-19.6 is in fact an increase in required performance from effective R-10 (say) to R-19.6.

The actual design implications of this will vary depending on building archetype, designed form, construction type, etc., and the actual level of de-rating may vary substantially.

This has been accounted for in the baseline models, using a de-rating factor in the NECB 2015 baseline walls while using the NECB 2020 baseline walls as-published. Other opaque elements such as roofs typically see less thermal bridging and have been left as is for both baselines (i.e. no de-rating assumed.)

A 40% de-rating factor has been used for all non-combustible construction Part 3 archetypes. Based on our experience, this is representative of typical to somewhat mitigated thermal bridging detailing. A 20%-30% de-rating would be representative of significant mitigation whereas 50%-60% would have been common prior to the current focus on thermal bridging (such as the Building Envelope Thermal Bridging Guide, BC Energy Step Code, and changes to the NECB 2017 and 2020). Examples of typical heat loss via thermal bridging details can be found in Video & Playbook: Thermal Bridging In Net-Zero Energy-Ready Building Design – ZEBx.

The low-rise MURB is intended to represent wood framed construction and a smaller (25%) de-rating factor has been used as typically wood frame buildings see less reduction in performance compared with non-combustible construction.

Heat Recovery in NECB 2017/2020

A second significant change in NECB 2017/2020 is how the requirement for heat recovery is evaluated. Previously, the requirement for heat recovery was calculated as a function of exhaust air temperature, outdoor air temperature, and exhaust airflow. In NECB 2017, the evaluation of heat recovery added parameters for hours of operation, percentage outside air, and total air flow. In some cases, this would lead to the same design requiring heat recovery where it previously did not, where in other cases it would lead to the opposite: the baseline

would no longer need heat recovery in NECB 2020 where it would in 2015. In most cases within this report the two are aligned; where they are not it is noted.

Schedules and Loads

Where default operating schedules or other non-regulated elements such as default internal loads may have changed, the NECB 2017 version (which is assumed to be aligned with what will appear in NECB 2020) was used for all scenarios including the NECB 2015 baseline. Residential loads specifically noted in the City of Vancouver Energy Modelling Guidelines v2, which is referenced in the Step Code, follow those guidelines. All other loads have been updated to the latest available version of NECB default loads.

2.1.2 Other Significant Part 3 Updates

Ventilation Rates to ASHRAE 62.1-2016

Based on discussion with BSSB, it is anticipated that the National Building Code (NBC) 2020 will reference ASHRAE 62.1-2016 Ventilation for Acceptable Indoor Air Quality. Currently in BC, BCBC 2018 references a significantly older version, ASHRAE 62.1-2001 without Addendum N. This report makes the assumption that given the code harmonization efforts, ASHRAE 62.1-2016 would be adopted in BCBC 2022, and ASHRAE 62.1-2016 is used for all Part 3 building models. This would have a significant impact on energy which will vary by building type and space mix, occupant density, and system type selection. In design, project teams could look to reduce the impacts of changing ventilation rates using heat recovery; this will mitigate the energy impact of any changes in rates.

In the archetype buildings used in this study, some archetype ventilation rates increase when updating from ASHRAE 62.1-2001 to 2016, while others decrease.

Multi-unit residential – in our particular unit sizes, depending on occupant densities, ranges from 35-40 cubic feet per minute (cfm) in 2001 to 48-53 cfm per unit in 2016.

Office rates reduce, from (in our case), from 0.43-0.53 cfm/sf for variable air volume (VAV) systems and 0.24-0.3 cfm/ft^2 for dedicated outdoor air systems (DOAS) for ASHRAE 62.1.-2001 (where the difference is due to variations in system effectiveness between VAV and DOAS), down to 0.21-0.23 cfm/sf and 0.12-0.13 cfm/ ft^2 respectively for ASHRAE 62.1-2016.

Retail rates have stayed relatively the same for the mall, but have dropped from 0.296 to 0.231 cfm/ ft^2 for big box.

Hotel rates have decreased by approximately 25%, from an average of 0.174 cfm/ ft^2 to 0.131 cfm/ ft^2.

The above rates should not be considered design guidance and would vary depending on calculation inputs. These rates were used in the energy model study.

City of Vancouver Modelling Guidelines v2

Another change to modelling strategies since the 2018 Metrics Report are the updates to version 2 of the City of Vancouver Energy Modelling guidelines; in particular infiltration rates have changed and now use 0.2 L/s/m^2 of exterior wall area as a constant value. This is used throughout this report.

Climate Zones

Climate zones 4 through 7a were simulated for all archetypes. BC also has regions of climate zones 7b and 8, which were simulated only for the Part 9, low-rise MURB, and hotel archetypes, as new construction of high rise MURB and office are relatively rare in these regions.

2.1.3 Analysis

Part 3 Program Variations

Each archetype has some program variations noted; these are elements that change in the use or programming of the building, rather than being energy related.

Table 2-3. Part 3 Program Variations Summary

Archetype	Program Variations
High Rise MURB	VFAR – full variations not modeled due to simulation time; see Section 6.1.2 for discussion and examples of impact. Suite size – 3 variations modeled, intended to represent small, typical, and large units.
Low Rise MURB	Same variations as high rise MURB.
Office	Office density– two density options; typical (NECB default) and double (heavily occupied office, increased people, ventilation, plug loads). IT loads – see Section 6.1.2 for discussion and examples of impact.
Retail	Big box retail store modeled as 100% retail, or mall modeled with mix of space types (see Appendix A for space mix details).
Hotel	Process loads for laundry changed between electric and natural gas.

Part 3 ECMs

Table 2-4. Part 3 ECM Summary

Archetype	ECMs
High Rise MURB	Walls: R-4, 7, 10, 20, 40 (note R40 walls may not be realistically achievable in a high-rise MURB with balconies). Roof: R-20, 40 Window: USI-2.5, 2, 1.6, 1.2, 0.8 Window SHGC: 0.3, 0.4 Air tightness: Code (City of Vancouver Energy Modeling Guidelines v2 (CoV)), half code, near zero (1/10th of half code value) Window to wall ratio: 20%, 40%, 60% HVAC: electric baseboard, fan coils with standard or condensing boiler or air source heat pump. Heat recovery ventilator (HRV): None, 60%, 80% Domestic hot water (DHW) load savings: 20% (low flow fixtures)
Low Rise MURB	Walls: R-4, 7, 10, 20, 40 Roof: R-20, 40 Window: USI-2.5, 2, 1.6, 1.2, 0.8 Window SHGC: 0.3, 0.4 Air tightness: Code (CoV), half code, near zero (1/10th of half code value) Window to wall ratio: 20%, 40%, 60% HVAC: electric baseboard, fan coils with standard or condensing boiler or ASHP. HRV: None, 60%, 80% DHW load savings: 20% (low flow fixtures), 40% (low flow fixtures + drainwater heat recovery)
Office	Walls: R-4, 7, 10, 20, 40 Roof: R-20, 40 Window: USI-2.5, 2, 1.6, 1.2, 0.8 Window SHGC: 0.3, 0.4 Air tightness: Code (CoV), half code, near zero (1/10th of half code value) Window to wall ratio: 30%, 50%, 70% Lighting savings: None, 25% HVAC: Hydronic variable air volume (VAV), Hydronic fan coil with dedicated outdoor air system (FC + DOAS) Heating: condensing boiler, air source heat pump (ASHP) with boiler top-up HRV: None, 60%, 80% DHW load savings: 20% (low flow fixtures), 40% (low flow fixtures + drainwater heat recovery)
Retail	Walls: R-4, 7, 10, 20, 40 Roof: R-20, 40, 60

	Window: USI-2.5, 2, 1.6, 1.2, 0.8 Window SHGC: 0.4 (only) Air tightness: Code (CoV), half code, near zero (1/10th of half code value) Window to wall ratio: 5%, 20% Lighting savings: None, 25%, 50% HVAC: Unitary gas rooftop unit (RTU), hydronic FC + DOAS with condensing boiler or ASHP with boiler top up HRV: None, 60%, 80% DHW load savings: 20% (low flow fixtures), 40% (low flow fixtures + drainwater heat recovery)
Hotel	Walls: R-5, 10, 15, 20, 30 Roof: R-20, 40 Window: USI-2.5, 2, 1.6, 1.2, 0.8 Window SHGC: 0.4, 0.3 Air tightness: Code (CoV), half code, near zero (1/10th of half code value) Window to wall ratio: 20%, 50% Lighting savings: None, 20%, 40% HVAC: Hydronic VAV, hydronic FC + DOAS with condensing boiler or ASHP with boiler top up HRV: None, 60%, 80% DHW load savings: 20% (low flow fixtures), 40% (low flow fixtures + drainwater heat recovery)

As noted in the table above, it may not be realistically possible to achieve R40 effective wall performance in a high-rise MURB with balconies, even with the use of mitigation measures for thermal bridging in balconies. The realistic performance in our calculations appears to top out in the range of R30-35 using current technology. We have simulated R40 and present those results here to maintain consistency with previous reporting and other archetypes, and to provide a bookend for maximum wall performance impact on energy. The impact of improving wall performance from R30-35 to R40 will generally be minimal, as this is expected to be in the range of diminishing returns for improvements in performance. Therefore the impact on the ability and cost to achieve targets is not expected to be significantly impacted; using an R30-35 wall is expected to give similar energy impacts and act as a practical maximum.

Both low- and high-rise MURBs have been simulated using window to wall ratios of 20%, 40%, and 60%. The results have been filtered using a minimum WWR of both 20% and 40%, and both tables are shown in the appendices. A concern was raised during initial consultations that WWR not be reduced too far for MURBs, therefore both sets of results are presented to represent design flexibility.

Standard efficiency boilers have been excluded from results; these are no longer considered commercially available, and condensing boilers are now typically used in new construction as the minimum efficiency option.

It may not be realistically possible to achieve a near-zero air leakage rate. The air leakage rate modeled is highly dependent on the geometry of the building, with larger buildings with less envelope area (i.e. lower VFAR) typically able to achieve much lower rates for similar styles of construction. The near-zero rate is modeled to provide a lower bookend to whole building energy performance impact. Where 0.1 L/s/m^2 (half of code rate) is able to provide sufficient savings, the near-zero rate has been excluded from results. In a few cases, a leakage rate below 0.1 may be needed at the highest Steps, and in those cases the lower rate is used. These cases are detailed in Appendix C: Detailed Modelling Outputs.

2.2 Part 9 Archetypes

2.2.1 Part 9 Building Archetypes

The same building archetypes as used for the original 2017 and 2018 reports were maintained, and one additional archetype was added, the smaller or laneway single family dwelling. The models are built in HOT2000 version 11.10, and have been run using the Housing Technology Assessment Platform (HTAP) software to simulate a large number of models within a given range of input variations, for example varying the wall R-value, window U-value, and roof R-value, one at a time and in combination to see potential impacts. In addition, variations in window to wall ratio and shape factor were modeled.

EnerGuide Rating System protocols were used in the HOT2000 energy models for the Archetypes. For example, one primary space heating system was used per HOT2000 file, and no supplemental space heating systems such as gas fireplaces, were included. Cooktops and clothes dryers were left on the default of being electric appliances. Any exterior appliances such as gas barbecues, patio heaters or ice melting systems were not included as these are not regulated under the BC Building Code.

The archetypes are outlined in the table below.

Table 2-5. Part 9 Archetypes

Label	Notes	Description	Total Floor Area (sq ft)	Ceiling Heights (ft)- top to bottom	Window Area (sq ft)	WWR
Small SFD	keep as per 2018 study	1 storey on crawlspace	1,100	3/8 (Note: 3 ft represents crawlspace)	144	0.09
Medium SFD	keep as per 2018 study	2 storeys on full basement	2,550	8/8/8	333	0.13
Large SFD	keep as per 2018 study	2 storeys on full basement	5,500	8/8/8	718	0.13
Quadplex	changed to slab on grade with detached parking- note the individual Quadplex units are pretty small already; no room for attached garages	3 storeys, on slab on grade, detached parking	5,526	8/8/8	825	0.16
6 Unit Rowhouse	keep as per 2018 study	3 storeys, on slab on grade	10,300	8/8/8	1750	0.16
10 Unit MURB	keep as per 2018 study	3 storeys, on parkade	17,800	9/9/9	2500	0.25
Laneway SFD	new	2 storeys on slab on grade	750	8/8	225	0.14
Medium SFD with higher WWR	new	increase WWR from 13% to 18%	2,550	8/8/8	461	0.18
Medium SFD with higher WWR	new	increase WWR from 13% to 23%	2,550	8/8/8	589	0.23
Medium SFD with higher SAR	new	increase SAR by 25%, keep WWR same	2,550	8/8/8	333	0.13
Medium SFD with higher SAR	new	increase SAR by 50%, keep WWR same	2,550	8/8/8	333	0.13

Label	Notes	Description	Total Floor Area (sq ft)	Ceiling Heights (ft)- top to bottom	Window Area (sq ft)	WWR
Large SFD with higher WWR	new	increase WWR from 13% to 18%	5,500	8/8/8	994	0.18
Large SFD with higher WWR	new	increase WWR from 13% to 23%	5,500	8/8/8	1270	0.23
Large SFD with higher SAR or SVR	new	increase SAR by 25%, keep WWR same	5,500	8/8/8	718	0.13
Large SFD with higher SAR or SVR	new	increase SAR by 50%, keep WWR same	5,500	8/8/8	718	0.13

2.2.2 Changes to BCBC Section 9.36

The proposed changes to BCBC Section 9.36 currently are relatively minor and we do not anticipate significant impacts on the base costs; these changes have been incorporated into the base case used for costing in this study.

There is a change to 95% minimum Annual Fuel Utilization Efficiency (AFUE) for furnaces. However, this is already captured in energy efficiency regulations so suppliers are currently selling 95% AFUE furnaces, and therefore there is no cost premium.

Window maximum USI-values are expected to decrease from 1.80 to 1.61 via the Energy Efficiency Standards Regulation effective January 1, 2022. Because this regulation is separate from the BC Energy Step Code or 9.36, and has not yet taken effect as of the time of conducting simulations, the base case remains at 1.80 in the current study.

2.2.3 Variations and ECMs

Shape Factor

New, modified versions of the medium and large single family dwelling archetypes were created for this study in order to evaluate the impact of increasing the building surface area to floor area ratio (SAR) in Part 9 buildings. For both the medium and the large single family dwelling archetypes, the SAR was increased by both 25% and by 50%, while keeping the window to wall ratio at the original value in the archetype. The SAR was increased by increasing the length of the exterior walls, keeping the height of exterior walls and the overall volume of the buildings the same. This approach resulted in an increase in the complexity of the building envelope geometry typical of complex buildings with a high form factor ratio.

Window to Wall Ratio

New, modified versions of the medium and large single family dwelling archetypes were created for this study in order to evaluate the impact of increasing the window to wall ratio (WWR) in Part 9 buildings. For both the medium and large single family dwelling archetypes, the WWR was increased from 13% to 18%, and from 13% to 23%. The window to wall ratio was increased by increasing the size of the windows, thus increasing glazing by orientation in the same proportion as the initial window layout.

ECMs

The below ECMs were analyzed. Some exceptions or limitations of combinations were applied in order to limit the number of runs and amount of data, for instance not combining the worst airtightness with the best windows or vice-versa. In addition, any individual ECMs that do not meet the base case for a particular climate zone or archetype were excluded, so for example if the base case requires R10 under slab in a colder climate, options below R10 were not run for that climate.

Note that this list also includes the base case values for initial starting runs. The base case descriptions are available in Appendix A.

Table 2-6. Part 9 ECMs

Component	Recommended Options	# of Choices	Change from 2018 Study
Airtightness (Air changes per hour (ACH)@50Pa)	3.5, 2.5, 1.5, 1.0, 0.6	5	same
Above Grade Wall Effective R value	16, 18, 22, 26, 30, 40	6	reduced from 8
Below Grade Wall Effective R value	11, 17, 21, 25	4	same
Under Slab Effective R value	0, 10, 14, 20	4	same
Floor Over Unheated Space Effective R value	28, 32, 36	3	reduced from 4
Ceiling Below Attic Effective R value	40, 50, 60, 80	4	reduced from 6
Flat Roof Effective R value	28, 32, 36	3	not used in 2018
Windows (USI/SHGC)	1.80/0.25, 1.60/0.25, 1.40/0.25, 1.40/0.35, 1.00/0.25, 1.00/0.35, 0.80/0.25	7	same
DHW Systems	electric tank (0.82 EF), natural gas tank (0.67 EF), natural gas tankless (0.95 EF), ASHP integrated tank (1.90 EF)	5	same
Drain Water Heat Recovery Systems (recovery efficiencies)	none, 30%, 55%	3	reduced from 5

Component	Recommended Options	# of Choices	Change from 2018 Study
Space Heating Systems	natural gas furnace (95% AFUE), electric baseboard, cold climate ASHP (heating seasonal performance factor (HSPF) 7.1) for Climate Zones 6, 7A, 7B and 8 with electric resistance back up heat if needed, regular heat pump for Climate Zones 4 and 5 with natural gas furnace back up (95% AFUE)	4	Reduced from 5
Ventilation Heat Recovery (SRE @ 0C)	none, 65%, 75%, 85%	4	reduced from 5

Table 2-7. Methodology to limit combinations of data

Limitations/exceptions:
No solar photovoltaic (PV) or solar domestic hot water (DHW) heating
No district energy systems
No geo exchange systems
No gas heat pumps
No P9.11 systems due to modelling challenges
Methodology to limit combinations of ECMs to save time running HTAP and reduce data:
Airtightness no tighter than 1 level tighter than required by Step; i.e. no tighter than 1.5ACH@50Pa for Step 3
Archetypes that use electric baseboard heat for their base case will not change to natural gas furnace; only upgrade to heat pumps
Higher window performance levels reserved for higher Steps
Drain water heat recovery systems reserved for Step 3 and higher
85% SRE HRV reserved for Step 4 and higher
Heat pumps for space heating reserved for Step 4 and higher
Heat pumps for DHW heating reserved for Step 4 and higher
*Certain combinations of ECMs, such as pairing the worst windows with the best airtightness, will be omitted. These omitted options target combinations that would use the best of one option with the worst of another; while these combinations may be used on actual designs based on project priorities, they are not considered as representative of typical scenarios. In addition, on many projects it may make sense to use heat pumps for lower Steps; these were omitted as they were expected to have higher cost at the lowest Steps for the archetypes modeled.

Climate Zones

The full range of BC's climate zones are modeled for all archetypes, providing a wide range of results including those in colder climate zones.

Table 2-8. Part 9 Climate Zones and City Locations

Climate Zone	Heating Degree Days	Weather File
4	up to 3000	Vancouver (2825 HDD)
5	3000-3999	Summerland (3350 HDD)
6	4000-4999	Cranbrook (4400 HDD)
7A	5000-5999	Fort St. John (5750 HDD)
7B	6000-6999	Fort Nelson (6710 HDD)
8	7000+	Uranium City, Sask. (7500 HDD)

*Note that HOT2000 has certain limitations of available weather files; the files above were selected to be representative of the climate zone but may not represent the largest population or construction centres in that climate zone due to availability of weather files.

2.2.4 Part 9 Metrics

Modelling Rowhouse Buildings

Rowhouse-type buildings such as the quadplex and 6-unit rowhouse archetypes, which consist of living units side by side, will be modelled as whole buildings for the purpose of this study. This follows the requirements in the BC Energy Step Code: *where a building contains more than one dwelling unit, the requirements of this Subsection shall apply to the energy performance of the building and not to individual dwelling units.*

The "BCESC Compliance Report Calculator" tool was not specifically used for this study since it requires manual input of data which would prove to be far too labor intensive for this study requiring automation of many thousands of different HOT2000 energy model runs. Spreadsheet analysis and macros were developed which performed similar calculations but allowed for automatic calculations for large numbers of results rather than using the manual calculator. In addition, the rowhouse-type buildings were modeled in HOT2000 as whole buildings with the appropriate amount of individual units and corresponding base loads included, and these HOT2000 models were then run with the various ECM's

% Better Envelope Metric

The percent better envelope metric is new since the 2018 costing study. This metric is often applied to housing that is larger, or has more complex or articulated shapes and higher SAR. A list of the percent better envelope metric target values for each archetype and for each climate zone are outlined in Table 2.9.

TEDI Adjusted Metrics

TEDI targets are calculated on a prorated scale; this is a new approach to TEDI targets since the 2018 costing study. TEDI targets are now calculated factoring in the specific heating degree days of the particular city location chosen to represent each climate zone. Note that the adjusted TEDI targets listed later in this report are not applicable to the entire climate zone, but rather for only the particular city location chosen.

MEUI Adjusted Metrics

MEUI targets are determined based on the heated floor area of the building, and whether the building has at least 50% of its floor area served by space cooling equipment. This results in different MEUI targets for different sizes of archetypes even for the same climate zone. When the particular ECM package includes a heat pump, which would also be able to provide air conditioning, it is assumed it was assumed that the heat pump would be used to air condition at least 50% of the building, and the corresponding MEUI target was used as part of the step code target values for that particular archetype period.

Table 2-9. Step Code Targets (BCBC 2018)

				Step 3							Step 4							Step 5					
Archetype	Floor Area (sq m)	Climate Zone (HDD)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)
Laneway House	70	4 (Vancouver 2825 HDD)		2.5	20	100	128	36.5	10%		1.5	40	80	108	26.5	20%		1.0	N/A	55	83	18.3	50%
		5 (Summerland 3350 HDD)				115	143	43.5	10%				90	118	33.5	20%				60	88	21.8	50%
		6 (Cranbrook 4400 HDD)				125	153	58.0	10%				95	123	46.0	20%				70	98	29.0	50%
		7A (Fort St. John 5750 HDD)				145	173	85.0	10%				110	138	62.5	20%				85	113	46.3	50%
		7B (Fort Nelson 6710 HDD)				165	193	100.7	10%				125	153	75.7	20%				95	123	57.1	50%
		8 (Uranium City 7500 HDD)				180	208	112.5	10%				140	168	87.5	20%				105	133	65.0	50%
Small House	102	4 (Vancouver 2825 HDD)		2.5	20	75	93	36.5	10%		1.5	40	60	78	20.5	20%		1.0	N/A	40	58	18.3	50%
		5 (Summerland 3350 HDD)				90	108	43.5	10%				70	88	33.5	20%				45	63	21.8	50%
		6 (Cranbrook 4400 HDD)				100	118	58.0	10%				75	93	46.0	20%				55	73	29.0	50%
		7A (Fort St. John 5750 HDD)				120	135	85.0	10%				90	108	62.5	20%				70	88	46.3	50%
		7B (Fort Nelson 6710 HDD)				140	158	100.7	10%				105	123	75.7	20%				80	98	57.1	50%
		8 (Uranium City 7500 HDD)				155	173	112.5	10%				120	138	87.5	20%				90	108	65.0	50%

			Step 3						Step 4						Step 5					
Archetype	Floor Area (sq m)	Climate Zone (HDD)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)
Medium House	237	4 (Vancouver 2825 HDD)	2.5	20	50	55	36.5	10%	1.5	40	40	45	26.5	20%	1.0	N/A	25	30	18.3	50%
		5 (Summerland 3350 HDD)			65	70	43.5	10%			50	55	33.5	20%			30	35	21.8	50%
		6 (Cranbrook 4400 HDD)			75	80	58.0	10%			55	60	46.0	20%			40	45	29.0	50%
		7A (Fort St. John 5750 HDD)			95	100	85.0	10%			70	75	62.5	20%			55	60	46.3	50%
		7B (Fort Nelson 6710 HDD)			115	120	100.7	10%			85	90	75.7	20%			65	70	57.1	50%
		8 (Uranium City 7500 HDD)			130	135	112.5	10%			100	105	87.5	20%			75	80	65.0	50%
Large House	511	4 (Vancouver 2825 HDD)	2.5	20	50	55	36.5	10%	1.5	40	40	45	26.5	20%	1.0	N/A	25	30	18.3	50%
		5 (Summerland 3350 HDD)			65	70	43.5	10%			50	55	33.5	20%			30	35	21.8	50%
		6 (Cranbrook 4400 HDD)			75	80	58.0	10%			55	60	46.0	20%			40	45	29.0	50%
		7A (Fort St. John 5750 HDD)			95	100	85.0	10%			70	75	62.5	20%			55	60	46.3	50%
		7B (Fort Nelson 6710 HDD)			115	120	100.7	10%			85	90	75.7	20%			65	70	57.1	50%
		8 (Uranium City 7500 HDD)			130	135	112.5	10%			100	105	87.5	20%			75	80	65.0	50%

			Step 3						Step 4						Step 5					
Archetype	Floor Area (sq m)	Climate Zone (HDD)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)	ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)
Quadplex	451	4 (Vancouver 2825 HDD)	2.5	20	50	55	36.5	10%	1.5	40	40	45	26.5	20%	1.0	N/A	25	30	18.3	50%
		5 (Summerland 3350 HDD)			65	70	43.5	10%			50	55	33.5	20%			30	35	21.8	50%
		6 (Cranbrook 4400 HDD)			75	80	58.0	10%			55	60	46.0	20%			40	45	29.0	50%
		7A (Fort St. John 5750 HDD)			95	100	85.0	10%			70	75	62.5	20%			55	60	46.3	50%
		7B (Fort Nelson 6710 HDD)			115	120	100.7	10%			85	90	75.7	20%			65	70	57.1	50%
		8 (Uranium City 7500 HDD)			130	135	112.5	10%			100	105	87.5	20%			75	80	65.0	50%
Rowhouse	1016	4 (Vancouver 2825 HDD)	2.5	20	50	55	36.5	10%	1.5	40	40	45	26.5	20%	1.0	N/A	25	30	18.3	50%
		5 (Summerland 3350 HDD)			65	70	43.5	10%			50	55	33.5	20%			30	35	21.8	50%
		6 (Cranbrook 4400 HDD)			75	80	58.0	10%			55	60	46.0	20%			40	45	29.0	50%
		7A (Fort St. John 5750 HDD)			95	100	85.0	10%			70	75	62.5	20%			55	60	46.3	50%
		7B (Fort Nelson 6710 HDD)			115	120	100.7	10%			85	90	75.7	20%			65	70	57.1	50%
		8 (Uranium City 7500 HDD)			130	135	112.5	10%			100	105	87.5	20%			75	80	65.0	50%

				Step 3							Step 4							Step 5					
Archetype	Floor Area (sq m)	Climate Zone (HDD)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)		ACH@50Pa	% Better than ERS Ref House	MEUI- no cooling (kWh/sq m*yr)	MEUI if >50% cooling (kWh/sq m*yr)	Adjusted TEDI (kWh/sq m*yr)	Envelope Performance Over ERS Ref House (%)
MURB	2523	4 (Vancouver 2825 HDD)		2.5	20	50	55	36.5	10%		1.5	40	40	45	26.5	20%		1.0	N/A	25	30	18.3	50%
		5 (Summerland 3350 HDD)				65	70	43.5	10%				50	55	33.5	20%				30	35	21.8	50%
		6 (Cranbrook 4400 HDD)				75	80	58.0	10%				55	60	46.0	20%				40	45	29.0	50%
		7A (Fort St. John 5750 HDD)				95	100	85.0	10%				70	75	62.5	20%				55	60	46.3	50%
		7B (Fort Nelson 6710 HDD)				115	120	100.7	10%				85	90	75.7	20%				65	70	57.1	50%
		8 (Uranium City 7500 HDD)				130	135	112.5	10%				100	105	87.5	20%				75	80	65.0	50%

3 Costing

3.1 Context

COVID-19

The effects of the COVID-19 coronavirus pandemic and related supply disruptions and shortages have largely been excluded from this analysis as they are anticipated to be relatively short term; and likely to not impact incremental costs (e.g. while they may impact the base price of a window, the difference between a typical and premium window is likely to remain relatively consistent). Some costs have been requested from local suppliers; we have requested current rough order of magnitude costs which may make some allowance for current market conditions.

Historical Changes

As was discussed in the 2018 Metrics Report, historically, the cost premiums of high-performance building components have gone down over time, as the technology develops and as the market matures.

Synergies

The costs within this report do not make use of the synergies that may be available and may assist project teams on an individual basis to optimize their designs. For example, air-source heat pumps are assumed to be sized entirely for heating and all cost is assigned as a heating ECM; in reality they may be sized for cooling and the only additional cost may be adding a heat pump internal heat recovery function, particularly in a case where peak heating loads have been substantially reduced through envelope and heat recovery measures. (Note that this heat recovery function differs from air-to-air heat recovery such as ERVs or HRVs; it is an equipment characteristic of a heat pump that would allow the cooling equipment to also provide useful space heating.)

Baseline for Costing Comparison

The baseline ($0 incremental capital cost) case for the study is the current BCBC 2018, which references NECB 2015 and the current 9.36. ECMs are assigned an incremental cost, and the total incremental cost for a particular simulation is calculated in comparison with that baseline. In some cases, a cost savings may be evaluated.

3.2 Methodology/Sources

Base Construction Costs

Base construction costs were sourced from the 2021 Altus Canadian Construction Guide, for both Part 3 and Part 9 construction. It was noted that the 2021 Altus Canadian Construction Guide specified the construction costs it lists were collected in the year 2020, and so represents a period in time both just before the initial impact of the COVID-19 pandemic began and a period of time in the first few months of the initial impact of the COVID-19

pandemic. Thus the costs it lists are neither exclusively pre pandemic nor are they exclusively during the pandemic.

For both the Part 3 and Part 9 building archetypes, the average of the high and low cost values was used as the base construction cost value.

Cost Database

RSMeans 2021 data was used to source most passive cooling measures, and to confirm costing for Part 3 ECMs including envelope measures and HRVs.

Local Contractors, Suppliers, and Consultants

Part 3 costing also relied on discussions with local contractors, suppliers, and consultants to obtain design and cost options from a number of sources and to obtain up to date local data. These values were vetted using RSMeans and in comparison with the 2018 Metrics Report.

2018 Metrics Report

In a small number of cases, in particular for roof insulation for Part 3 buildings, we have used the costs from the 2018 Metrics Report, applying 2% inflation per year over the last 3 years. Roof insulation in particular is a relatively small component of costs, and this is not expected to introduce significant error.

Average of 10 Best

In order to avoid using outlier values, the results presented for costs (for incremental capital cost, NPV, and GHG abatement costs) in this report use the average of the 10 best, rather than the single best option. "Best" has been considered in terms of ICC, NPV, and cost of GHGI abatement for both Part 3 and Part 9.

LEEP

Part 9 modelling is conducted using HTAP, which builds in NRCan's LEEP database for costing. The costing included in LEEP is dated early 2020, and was developed by NRCan in consultation with local builders.

The construction cost information collected from builder companies of various sizes located in the Lower Mainland, Vancouver Island, and the Okanagan as part of the early 2020 LEEP work were incorporated into the HTAP programming used for this study. The costing information collected in early 2020 just predates the COVID-19 pandemic beginning, and represents typical construction costs not including the effects of the pandemic.

3.3 Regional Costs

Costs are multiplied by a location multiplier; this multiplier is maintained from the 2018 Metrics Report. Both base costs and ECM costs apply the multiplier.

Table 3-1. Climate Zone Cost Multipliers

Climate Zone	Cost Multiplier
4	1.000
5	1.073
6	1.126
7A	1.502
7B	1.502
8	1.502

3.4 Costing Assumptions

Discount Rate

A 3% discount rate is applied. A brief sensitivity analysis was conducted and is shown in Section 6.1.5.

Utility Rate

For non-residential Part 3 buildings, utility rates use BC Hydro's Large General Service for electricity and Fortis BC's Rate 2 (<2000 GJ/year) rate for natural gas. Actual utility rate structures for different building sizes or services may vary, however the rates used can apply to any of the Part 3 archetypes. MURBs are modeled using residential rates as per below.

Utility cost escalation rate is modeled at 2%. Utility rate details for Part 3 are available in Appendix A.

For Part 9 buildings, residential rates for both electricity (Hydro rates) and natural gas (Fortis BC rates) were used. Utility cost escalation rate is modeled at 2%.

Table 3-2. BC Hydro Electricity Residential Rates

Name	Applicability	Energy Cost ($/kWh)	Energy + Carbon Tax ($/kWh)
Tier 1	0 – 1,350 kWh/month	0.09410	0.09460
Tier 2	1,350+ kWh/month	0.14100	0.14150
Meter Fixed Fee	Meter Fixed Fee	$75.92 (annual fixed fee)	

Table 3-3. Fortis BC Natural Gas Residential Rates (Part 9)

Name	Applicability	Energy Cost ($/GJ)	Energy + Carbon Tax ($/kWh)
Consumption Charge	Energy use	9.265	11.5775
Meter Fixed Fee	Meter Fixed Fee	$153.88 (annual fixed fee)	

Incentives

Incentives may be available for certain systems included as energy conservation measures in this study. Incentives have not been included in the cost analysis, as the available incentives may differ over time, or based on project ownership, location, and other factors.

Carbon Pricing:

Currently the models assume that federal government commitments will remain as is; with carbon pricing hitting $170/ton in 2030. After 2030, the current model assumes a slightly slower but continued linear increase, hitting $300 at the final year of our 20-year analysis period. The impact on average natural gas cost over the 20-year period is shown below, based on the current GHG factors contained in the City of Vancouver Energy Modelling Guidelines v2.0.

The same approach was taken for Part 9 and Part 3.

Table 3-4. Carbon Pricing Scenarios

Years	Discount Rate	Escalation	Carbon Pricing	Average NG Cost over analysis period, in 2021 dollars
20	3%	2%	$45 in 2021 $50 in 2022 and after	12.75
20	3%	2%	$45 in 2021 $50 in 2022 Linear increase to $170 in 2030 Stay at $170 to 2040	15.98
20	3%	2%	$45 in 2021 $50 in 2022 Linear increase to $170 in 2030 Escalate to $300 at final year of 20-year period (linear increase $13/year 2030 through 2040)	17.16

NPV Calculation

The NPV calculation is conducted over a 20-year timeframe. This maintains a consistent life cycle replacement timeline for all major components included in this analysis. This approach is consistent with the 2018 Metrics Report, and further discussion on this approach can be found there.

Detailed Costs

Detailed cost data is available in Appendix B for Part 3. ECM costs for Part 9 are integrated into the detailed modelling results for each scenario in Appendix C; this breaks out the base building and ECM cost for each ECM in each modeled option.

4 Carbon Emissions

4.1 Operating Carbon

Operating carbon refers to the ongoing CO_2 emissions related to the energy use of the building. The modelling analysis in the study focusses on electricity and natural gas, as the two most common energy types used by buildings in BC.

For this analysis, the greenhouse gas emissions factors from the City of Vancouver Modelling Guidelines v2.0 are used:

Natural Gas: 0.185 kgCO_2e/kWh

Electricity: 0.011 kgCO_2e/kWh

A sensitivity analysis has been conducted to understand the potential impact of varying the energy source and grid mix.

Energy Supply

The electric grid in BC includes the Integrated grid (supplying southern and western BC), the Fort Nelson grid (northeast BC), and community generating stations for isolated grid communities (throughout BC). The Fort Nelson grid and the community generating may have very different GHG emissions factors than the Integrated grid.

In 2020, the Fort Nelson grid had approximately 13.2 times higher emissions than the Integrated grid. In 2012, the Fort Nelson grid represented approximately 0.3% of total BC Hydro service area sales, according to BC Hydro's Electric Load Forecast, Fiscal 2013 to Fiscal 2033. At the time of the report, the Fort Nelson grid's demand was expected to grow, however, this still represents a relatively small proportion of connections. While these need to be accounted for in the policy, either an exclusion or simply applying the same GHGI factors and thereby requiring similar measures to the rest of the province, could be considered without significantly impacting the overall impact of the targets. The same BC Hydro report also noted that a significant portion of load on the Fort Nelson grid came from large industrial accounts, which would not be impacted by Step Code targets.

Table 4-1. 2020 Electricity GHG Emission Intensity Factors

Grid	Tonnes CO_2 equivalent per Gigawatt-hour
Integrated grid	40.1
Fort Nelson grid	530

Source: https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/reporting/quantify/electricity

In addition to electricity and natural gas, other fuels or energy sources, such as district heating, diesel, biomass, or photovoltaics (among others) would have significant differences in operating carbon compared with buildings using electricity or natural gas. These additional energy or heating sources can have significant variations in greenhouse gas emissions factors even within the same category of supply; for example a district energy system could combine low-GHG technologies and renewable electricity generation, could use conventional fossil fuel supply and have high transmission losses, or could be somewhere in between.

Further, there are a number of possible sources for green energy emissions factors which may be treated differently by different programs. These variations are not addressed within this report, which focusses on fuel sources that are widely applicable throughout BC.

A summary of the emissions factors discussed is shown below.

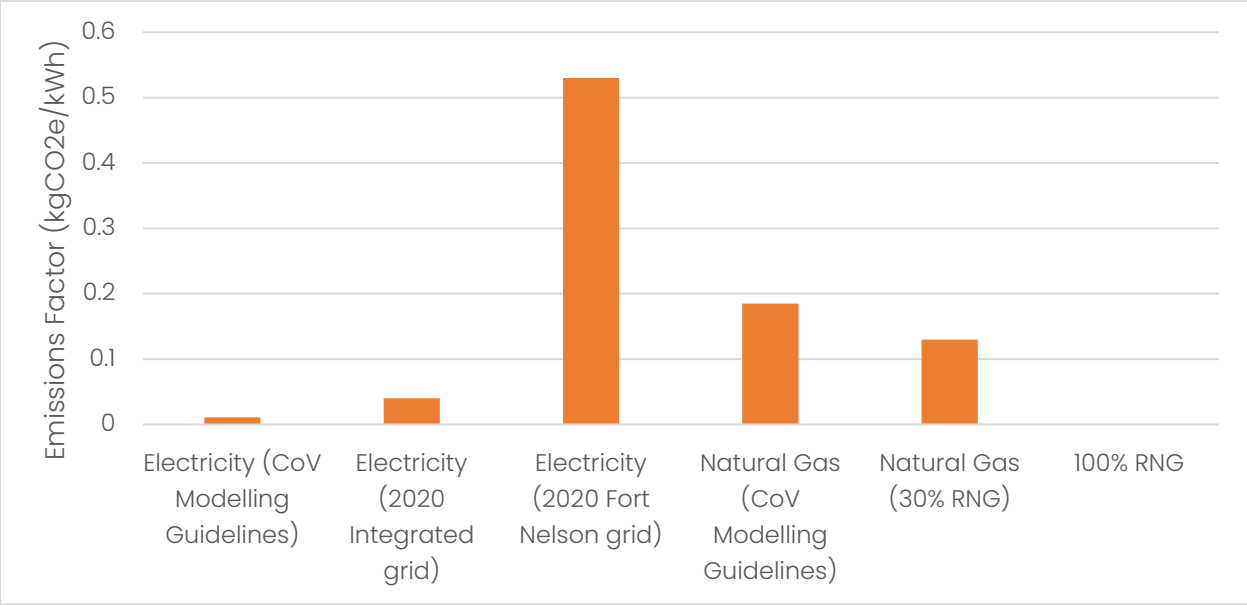


Figure 4-1. Greenhouse Gas Emissions Factors

Where a certain percentage of RNG is shown in the graph, (e.g. Natural Gas (30% RNG)) this indicates that 30% of the total supply of natural gas (either to the building or to the overall utility supply network) consists of RNG. This has been shown as an effect of approximately a 30% reduction in the emission factor compared with a fully natural gas option.

Energy Conservation Measures

The energy conservation measures (ECMs) analyzed within this report will impact greenhouse gas emissions; reducing energy use will naturally reduce operating emissions as well. Further, for a fossil fuel heated building, a focus on TEDI reductions will target one of the largest sources of GHG emissions in the building, heating.

However, the impact of ECMs will typically be smaller than the impact of energy sources. In BC's relatively low-carbon electricity grid, ECMs would need to save in the range of 80-95% of heating energy to achieve the carbon equivalent to a switch from natural gas to electricity.

To provide one example of impact, the below figure shows a MURB in climate zone 4 going from R-4 walls to R-40 walls, leading to an 18% TEUI and 41% TEDI savings. This nets a 30% GHGI savings. Leaving the walls at R-4 but switching to electric baseboards leaves TEDI unchanged and provides some TEUI savings (due to both boiler efficiency and fan energy in this particular mechanical system setup of boiler with fan coil units), but leads to 58% GHGI savings – nearly double the savings of the wall ECM.

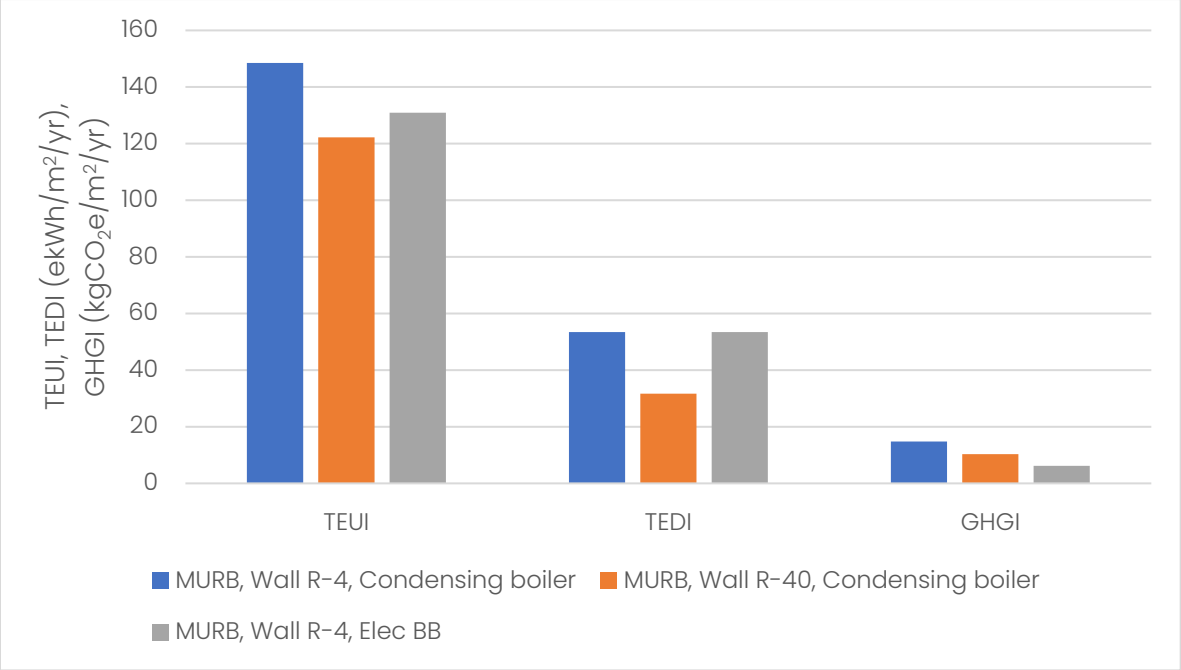


Figure 4-2. ECM impact on GHGI

However, it is not generally feasible or advisable to simply fuel switch with no attention to ECMs; attention must be paid to both. In general, electric heating and electric hot water heating may be provided either through electric resistance (such as electric baseboards or electric resistance DHW heaters), or through heat pump or related technologies such as variable refrigerant flow.

Electric resistance heating has low installation costs (e.g. electric baseboards), but higher operating costs than natural gas. Actual cost differentials vary based on utility rates and future carbon tax scenarios, but are generally between 1.5 and 3 times as costly to operate in terms of utility costs for heating energy. The potential increase in operating cost can be offset by energy savings in the design, by reducing TEDI by a similar proportion. As an example, this might represent a TEDI improvement from 40, meeting Step 2, to 20, meeting Step 3 and approaching Step 4, in a MURB in climate zone 4. This is expected to be achievable using the ECMs outlined in this report.

Alternatively, projects may look at heat pump or similar options such as variable refrigerant flow (VRF). These have a higher operating efficiency, with coefficients of performance (COPs) typically ranging between 2 and 4 (which can be thought of as an efficiency of 200% - 400%). This brings utility costs into the same range as natural gas heating, and in fact leads to lower

heating utility costs within the next 10 years as carbon taxes increase to the federal commitment of $170/tonne in 2030.

> Both energy conservation measures and low-carbon energy supply must be considered in combination to achieve significant reductions in greenhouse gas emissions.

However, heat pumps and similar technologies tend to have higher capital costs, and may require more floor area within the building to locate equipment. In this case, ECMs that reduce heating load are important in order to reduce the size of equipment, to reduce capital costs and space requirements.

Finally, the demand on the electrical grid and distribution infrastructure should be considered in consultation with the electricity supplier, both within the Integrated grid and local grids.

Technology Drivers

A synergy that some design teams may find useful is the potential to use heat pumps or VRF systems to provide both heating and cooling. While the use of mechanical cooling is typical in commercial buildings, it is not a given in residential buildings in BC. A desire by teams to provide mechanical cooling, or a need to do so based on overheating risk may drive decision making.

Domestic hot water heating is still predominantly natural gas in our experience on recent new construction projects. While electric resistance and heat pump options are available in the BC market, and heat pump options are currently incentivized by utility rebate programs, adoption is still in the relatively early stages. With increasing carbon taxes, continued technology development, and increasing market penetration, it appears likely that this will continue to grow in adoption.

4.2 Embodied Carbon

Embodied carbon is not considered within the scope of this report, which focusses on greenhouse gas emissions related to ongoing utility use in the building. Embodied carbon is an important consideration and should not be ignored; an overall life cycle balance minimizing greenhouse gas emissions should be struck.

As energy use and operating greenhouse gas emissions in buildings drop, embodied carbon becomes a larger share of the overall life cycle carbon impact of the building. As such, the impacts of policies targeting operating carbon should also consider the impacts on embodied carbon in buildings.

The study "Implications of the BC Energy Step Code on GHG Emissions" (Integral Group, 2019) notes several significant impacts on greenhouse gas emissions:

1. Reducing embodied carbon will require a focus on the materials of the building (such as the City of Vancouver's life cycle analysis requirements).
2. Methane leaks in natural gas distribution systems are noted as significant contributors to global warming, and while renewable natural gas can mitigate the impacts of this,

the projected supply of 30% will not significantly displace natural gas by 2030 and risks locking buildings to heating systems run primarily on conventional fossil fuel based systems until their replacement.

3. Electric heat pumps contain refrigerants, many of which have high global warming potential. This can be mitigated by regulating the refrigerant types that can be used, but should be considered and reported.

The current report analyzes the impact of the envelope on operating energy and GHG emissions. There is a concern that at high insulation levels, increasing insulation further could lead to increased embodied carbon, and that particularly in a scenario where heating is supplied by BC's relatively low emission electricity grid, there may be cases where additional insulation has a net negative life cycle carbon impact. This can be mitigated through materials choices and a focus on thermal bridging to achieve maximum utility of increased insulation.

5 Overheating Risk Analysis

The City of Vancouver Energy Modelling Guidelines v2.0 include a requirement to conduct an overheating risk analysis, and a methodology for doing so, for buildings that are not designed with a full mechanical cooling system. Most commercial buildings are typically designed with a full mechanical cooling system, potentially also employing passive cooling measures to reduce loads, and are not analyzed in this study. However, MURBs are frequently designed without full mechanical cooling, and may rely on passive cooling strategies to maintain occupant comfort.

Part 3 MURBs are modeled within this portion of the study, and a variety of passive cooling measures are considered.

The methodology defined in the City of Vancouver Energy Modelling Guidelines v2.0 is followed in this study, and requires modellers to assess the number of hours that exceed the comfortable indoor air temperature. Comfort conditions are defined based on the ASHRAE 55-2020 80% acceptability limits, on a monthly basis, and depend on the temperature of the outdoor air over the previous month. A limit of 200 hours per year is set, as well as a limit of 20 hours for vulnerable populations.

5.1 Weather

The passive cooling analysis uses both 2020s and 2050s future projected weather files from the Pacific Climate Impacts Consortium (PCIC) (https://services.pacificclimate.org/demo/wx-files/app/).

Over time, the temperature is expected to increase, though the rate may vary depending on how climate change progresses. Energy modelling uses "typical weather year" files developed statistically based on the previous 30 years of actual observed weather. The CWEC 2016 files currently in use are in fact a backwards-looking amalgamation of data going back as far as 1984, when the climate was very different than today's. The weather files used for this overheating risk portion of the study use forward looking scenarios estimating potential projections in the 2020s and 2050s for typical weather years. Climate zone 8 (Yellowknife) uses CWEC 2016 weather files only, as projected 2020s and 2050s files are not available.

Extreme events, such as heat waves, are not represented in available future-projected weather files to evaluate extreme conditions under which life safety issues may occur. These extreme weather events are expected to occur with increased frequency and severity as climate change continues to progress.

As anticipated, over time the number of warm hours increases compared with the currently used typical weather file. The CWEC 2016 weather file includes 6 hours over 27°C for Vancouver, increasing to 58 hours in the 2050s file. For Fort St John, there are 41 hours over 27°C in the 2016 weather file, but 137 hours in the 2050s file. 27°C is used as an example threshold here to illustrate the increasing typical temperatures; bin analysis for the number of hours between 25°C and 30°C are shown below at 1°C increments.

However, it is important to note that these 2020s and 2050s future looking weather files still fundamentally look at "typical" weather for energy modelling purposes. Extreme events, such as heat waves, are still not adequately represented to evaluate extreme conditions under which life safety issues may occur. These extreme weather events are expected to occur with increased frequency and severity as climate change continues to progress.

Table 5-1. Hours above temperature bin analysis for future projected weather, CZ4 and 7a

	Vancouver			Fort St. John		
Hours above:	CWEC 2016	2020s	2050s	CWEC 2016	2020s	2050s
25°C	31	50	155	108	140	248
26°C	14	30	92	67	98	199
27°C	6	13	58	41	63	137
28°C	0	5	29	11	32	95
29°C	0	0	14	3	10	58
30°C	0	0	6	0	3	37

*The above table does not capture extreme weather events, and looks at typical weather years only.

Table 5-2. Hours above temperature bin analysis for 2020s projected weather, all zones

	2020s					
Hours above:	Vancouver (CZ4)	Kamloops (CZ5)	Prince George (CZ6)	Fort St. John (CZ7a)	Fort Nelson (CZ7b)	Yellowknife (CWEC 2016, CZ8)
25°C	50	668	108	140	139	63
26°C	30	544	77	98	82	44
27°C	13	436	60	63	51	20
28°C	5	338	41	32	30	16
29°C	0	265	27	10	9	6
30°C	0	208	19	3	0	0

*The above table does not capture extreme weather events, and looks at typical weather years only.

The most mild location of those considered in this study in terms of overheating risk based on the 2020s projected weather is Vancouver in climate zone 4.

Climate change is increasing the frequency and severity of unusual weather events, such as the heat dome that recently affected much of BC with record breaking hot weather. In that heat wave, there were 40 hours above the acceptability limit outdoors (using the SFU weather station), over the course of 4 days, exceeding in a single event the annual overheated hours limit for vulnerable populations, and leading to a significant number of deaths in BC.

The below graph shows outdoor air temperature, whereas comfort conditions look at indoor temperature. Passive design measures such as night pre-cooling may help to mitigate the impact of outdoor air temperature on the indoor environment, although in this particular event the night temperatures were also too high to provide meaningful night pre-cooling.

However, a significant portion of passive cooling design measures rely on outdoor temperatures being relatively comfortable. The absence of good cooling design may also lead to indoor air temperatures being significantly higher than ambient outdoor air temperatures, putting occupants at elevated risk.

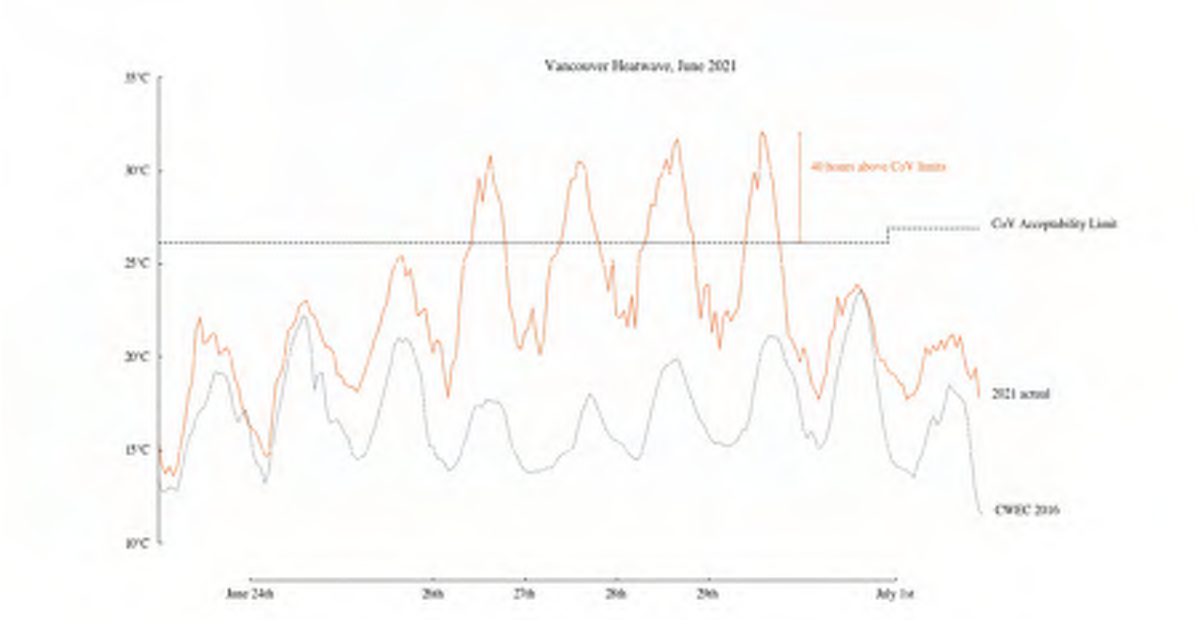


Figure 5-1. June 2021 heat wave (SFU campus weather station) vs. CWEC 2016 weather file

The frequency and severity of forest fires is also expected to increase. Passive cooling strategies which rely on the use of unfiltered outdoor air, such as operable windows, should anticipate periods of unavailability due to poor or dangerous outdoor air quality.

The figure below shows wildfire smoke events in 2020 in Vancouver, plotted with CWEC 2016 and future shifted 2050s weather. While the major smoke events in 2020 did not coincide with the hottest periods of the typical weather year in that case, the longest smoke event, which would have prevented most occupants from opening windows for several days, occurred within weeks of one of the hottest periods of the year.

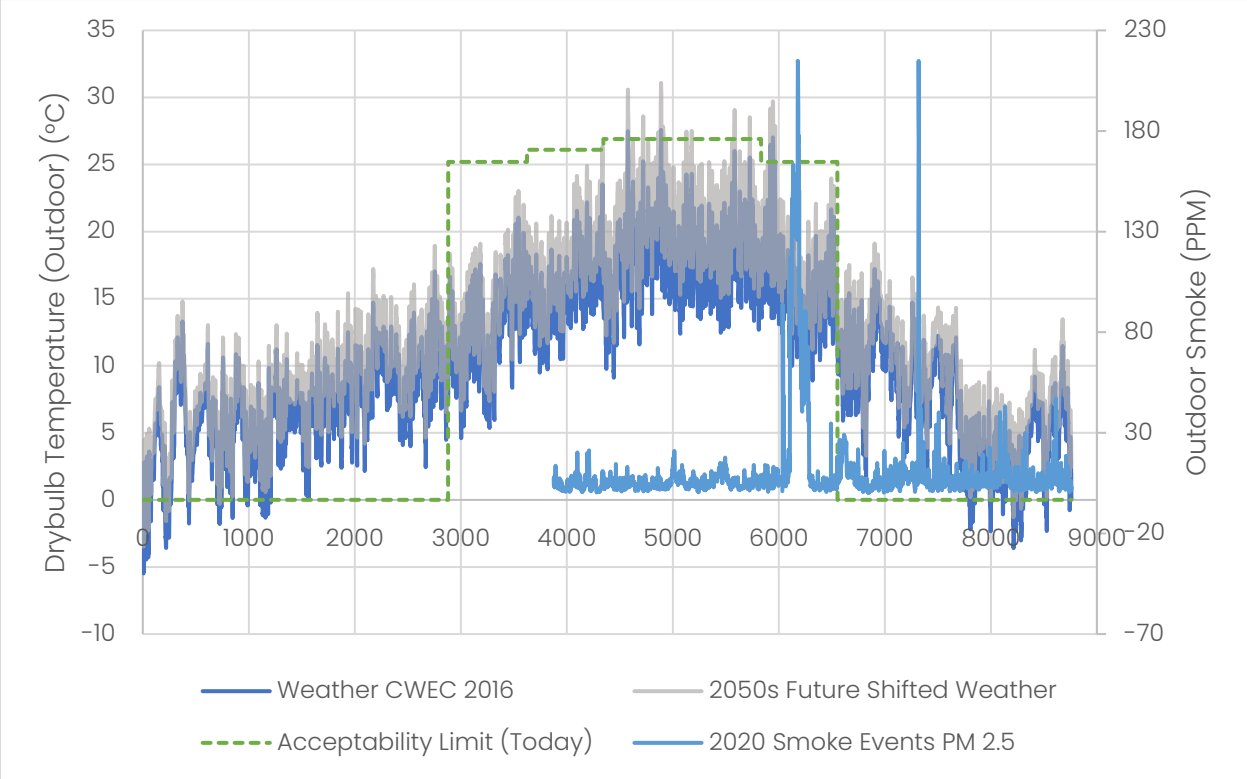


Figure 5-2. Smoke events in 2020 compared with weather

As extreme weather events become more common, the effectiveness of some passive cooling measures will be reduced during certain events. However, good passive cooling design, coupled with active cooling measures, becomes even more critical to achieving occupant comfort and mitigating risk to occupants. Simply using mechanical cooling and ignoring passive cooling design would increase risk to occupants during power outages or equipment failure, particularly if these occur during increasingly common extreme weather events. Both passive and active measures should be considered.

5.2 Passive Cooling Measures

A number of passive cooling measures are considered within this analysis.

From a modelling perspective, the same model as was used for the high- and low-rise MURBs has been used, however it has been modified to add a natural ventilation analysis as well as the passive cooling measures analyzed. This adds simulation computing time to the model as the software must perform more complex calculations, therefore the passive cooling measures analysis is performed separately from the ECM analysis discussed elsewhere in the report. Passive cooling measures are in large part independent from the ECMs analyzed elsewhere, if applied appropriately. For example, while operable windows tend to have higher U-values than fixed windows, achieving an overall U-value matching the ECM levels analyzed

can still be targeted. HRV bypass can be applied on low- or high-efficiency HRVs. Lighting is modeled with no lighting savings in the passive cooling measures analysis, which is the worst case scenario in terms of internal heat gains from lighting. One exception of note is that shading systems designed as a passive cooling measure may increase TEDI, in the event that the shading systems not only block the undesired summer or shoulder season sun, but also block desired winter solar gains that assist in reducing heating loads and providing occupant indoor environmental quality. There exist a number of design measures such as movable shades that can be used to reduce this effect.

However, the building envelope, window to wall ratio, and solar heat gain coefficient, which were all part of the ECM simulation, may have a significant impact on passive cooling and have also been included within the passive cooling analysis. Envelope has been simulated using three packages, low-, mid-, and high-performing, described below, intended to provide a bookend analysis of potential impact.

For this overheating analysis, envelope thermal performance and air tightness ECMs were combined into a single measure, described as low-, mid-, and high-performance levels. A low-performance envelope would meet Step 2 for a MURB in climate zone 4 for a VFAR of 0.6. A mid-performance envelope would meet Step 2-3 in climate zone 4. A high-performance envelope for this analysis would meet Step 4 in all climate zones, though naturally all of the Step levels would be dependent on additional factors such as shape, window to wall ratio, HRVs, etc.

One further element which has not been fully investigated as part of this study are the impacts of internal gains, such as plug loads, cooking loads, etc. These are modeled using City of Vancouver Modelling Guidelines v2.0 values and schedules, which are generally aligned with NECB internal loads. Internal loads can have a significant impact on overheating. Some time shifting or load reductions may be able to be done by occupants, such as avoiding cooking during the hottest periods of the day, however such strategies may not be viable for all occupants. In addition, much higher internal loads could be seen in reality, which would increase overheating.

Table 5-3. Passive Cooling Variations

Variation	Analysis Range
Envelope	Low = R-4 walls, R-20 roof, USI-2.5 windows, code infiltration Mid = R-10 walls, R-40 roof, USI-2.0 windows, code infiltration High = R-20 walls, R-40 roof, USI-1.2 windows, near-zero infiltration
Window to wall ratio	20%, 40%, 60%
Weather	2020s, 2050s future shifted PCIC typical operating year files (RCP8.5)

Table 5-4. Passive Cooling Measures

Measure	Analysis Range
SHGC	0.2, 0.4
Night pre-cool	16°C, 18°C
HRV Bypass	Yes, No
HRV Boost	Yes (20%), No (note only provided if there is also an HRV bypass)
Exterior Shading	0.6m overhang above window (all facades), fin 0.6m depth spaced approximately every 5m (south and west façades), movable exterior shades (e.g. roller shades)
Operable windows	0%, 5%, and 20% of equivalent window area if WWR is 40%

In several cases, the model was re-run using inputs that would not be appropriate for determining TEDI or TEUI for compliance purposes. For example, night pre-cool does not significantly assist cooling if the daytime setpoints immediately turn on heating to warm the space up. We would typically expect occupants to turn the thermostat down on a seasonal basis to allow for some night pre-cool and for the space to be gradually warmed by the sun and outdoor temperatures. As such, TEDI and TEUI are not reported in combination with overheated hours. A discussion of the impacts of the passive cooling measures modeled on TEDI and TEUI is provided in the results discussion section.

Unmet hours are analyzed as those not meeting the indoor maximum temperatures described by month in the City of Vancouver Modelling Guidelines, and are summed for individual zones. The zone with the largest number of overheated hours is taken as the hours overheated for the building.

Unmet hours are reported based on a simplified ASHRAE 55-2020 80% acceptability limit based on their adaptive comfort model. The limits are calculated by calendar month rather than as a rolling average of the previous up to 30 days. This methodology is in line with the City of Vancouver Energy Modelling Guidelines, and allow simpler calculation and reporting.

The 80% acceptability limits are applicable only for months when the mean outdoor air temperature is above 10°C, as such some climate zones have fewer applicable months than others. All analysis ignores localized areas of potential discomfort within a zone, which cannot be assessed using a typical energy model.

Table 5-5. Acceptability limit maximum indoor air temperature by month: simplified ASHRAE 55

Max. indoor air drybulb temperature (°C)	Vancouver	Kamloops	Prince George	Fort St John	Fort Nelson	Yellowknife
May	25.2	25.9	24.4	24.4	NA	NA
June	26.1	26.7	25.6	25.7	25.9	25.6
July	26.9	28.1	26.1	26.5	26.6	26.7
August	26.9	28.1	25.9	26.1	25.9	25.9
September	26.1	26.1	NA	24.5	NA	NA

While previous recent outdoor temperature does play a role in comfort, research also indicates that there are maximum acceptable or safe indoor air temperatures in which other factors play a role. BC Housing's Builder Insight 19 discusses a recent study (Kenny, Flouris, Yagouti, & Notley, 2019) by the University of Ottawa attempting to establish maximum indoor temperature conditions for human life safety. The conditions were found to vary based on individual characteristics, but a trend of 26°C was suggested, and BC Housing recommends reporting the number of hours above 26°C. The number of hours over 26°C is reported in the analysis.

The results of the analysis are shown in Section 6.1.4 in the Results section of the report.

6 Results

6.1 Part 3

6.1.1 Impact of NECB 2020

The increased stringency of NECB 2020, which is intended to be adopted in the upcoming version of the BC Building Code, leads to a need for increased stringency of the BC Energy Step Code minimum performance. The below is a summary of our recommendations, which is followed by a more in-depth comparison of NECB 2015, NECB 2020, and current Step Code targets.

The goal is for the new minimum target to require better performance than NECB 2020; and in addition, for performance to be at least 20% better than the 2018 BCBC.

Table 6-1. Recommendations for Updated BC Energy Step Code Targets – Part 3

Archetype	Recommendation for New Minimum Step
MURB (high- and low-rise)	Step 2
Office	Step 2
Retail	Step 2
Hotel	Step 2

Our recommendations are based on the following:

Incremental Approach

Our recommendation is to take an incremental approach, increasing the minimum by a single Step, rather than leapfrogging to the highest Step.

1. This aligns with previous messaging and industry perceptions around the future progression of the BC Energy Step Code and its development.
2. Projects that have variations such as shape, size, and occupant density, may have limitations in being able to achieve higher Steps, compared with the archetypes modeled in this report. This further supports the incremental approach proposed, increasing the stringency gradually, as long as the NECB 2020 minimum performance is shown to be met. While limited analysis on certain variations have been done here, the impacts of these variations should be considered as an area for further study.

Meeting NECB 2020

Our recommendation takes an approach of balancing the TEDI and TEUI metrics that appear in the BC Energy Step Code.

1. We have confirmed that based on the archetypes modeled, the NECB 2020 baseline would need to be improved upon in some way in order to meet Step 2 targets; in other words a Step 2 building would generally meet the NECB 2020 in terms of either TEDI or

TEUI or both. The percentage improvement of a Step 2 building versus NECB 2020 would vary but an improvement is generally supported by the archetype models.

2. A slight increase in stringency of Step 2 TEUI requirements could also be considered for office and retail archetypes. Average TEDI of Step 2 is better than NECB 2020 baseline TEDI, however average TEUI for those two archetypes would not.

3. It should be noted that it cannot be said with 100% confidence that all designs meeting Step 2 would be better than NECB 2020; this is true of current Step Code targets as well and becomes increasingly true as stringency of the base code increases. This is the nature of comparing absolute and baseline targets. Baselines exclude the impacts of, for example, building size and shape, by comparing the proposed design to one of the same size and shape. However, absolute targets such as TEUI and TEDI allow credit or penalty for these design factors. As such, we can compare the impacts on particularly archetypes (as is done in this study) and variations on those archetypes, but a fully generalizable comparison is not possible.

The table below shows the average TEUI and TEDI savings for each modeled Part 3 archetype across the full range of modeled climate zones. The savings show the savings of a building minimally meeting the Step targets compared with NECB 2020. All archetypes on average meet the NECB 2020 at Step 2 in terms of either TEUI or TEDI. Office and retail archetypes, on average, do not meet the NECB 2020 TEUI based on Step 2, but do meet if TEDI is considered. Both archetypes have relatively favorable shapes; if a less favorable (higher VFAR) shape was considered, both would show additional savings compared with the baseline. In that case, both the baseline and proposed would use a higher proportion of heating in comparison with other end uses, and the TEDI savings would be magnified, along with the more efficient than baseline provision of heat, leading to greater savings versus the baseline.

MURB and hotel show savings compared with NECB 2020 at Step 2 for both TEDI and TEUI. NECB 2020 considers only TEUI as a compliance metric; however we have suggested considering TEDI as part of this analysis as this is a significant metric within the BC Energy Step Code.

Step 4 is not considered below as this is not expected to be considered as a potential minimum Step for any archetype.

Negative values indicate that the Step considered is less stringent than the NECB 2020 baseline.

Table 6-2. Savings of Steps 2 and 3 Targets vs NECB 2020

Archetype		Average TEUI Savings	Range of TEUI Savings	Average TEDI Savings	Range of TEDI Savings
MURB (high- and low-rise)	Step 2	12%	-3% to 27%	27%	4% to 47%
	Step 3	20%	8% to 35%	45%	20% to 63%
Office	Step 2	-22%	-28% to -14%	6%	-22% to 36%
	Step 3	4%	2% to 7%	38%	19% to 58%
Retail	Step 2	-16%	-28% to 0%	16%	-15% to 52%
	Step 3	13%	2% to 9%	39%	9% to 68%
Hotel	Step 2	29%	22% to 34%	51%	31% to 67%
	Step 3	39%	35% to 43%	62%	54% to 71%

In addition, a 20% savings of the new minimum Step target vs. NECB 2015 is desired. Only TEUI and TEDI are considered; however new proposed GHGI targets will also add a relevant dimension to the targets and are expected to lead to substantial and targeted GHG reductions.

For all archetypes except retail, Step 2 TEUI and TEDI both meet the 20% savings threshold compared with NECB 2015. Retail is very close with TEDI (19% average savings), but ranges from 10% higher than NECB 2015 to 9% savings for TEUI. As noted above, retail uses a very favorable shape (VFAR), and would show additional savings compared with the baseline if a less favorable shape were selected for the analysis due to magnifying the TEDI savings and more efficient heating system savings. Given the TEDI savings, anticipated GHG savings with new targets, and the variability of savings based on building size and shape, climate zone, and other characteristics, an incremental improvement of the minimum to Step 2 for all building types continues to be recommended.

Table 6-3. Savings of Steps 2 and 3 Targets vs NECB 2015

Archetype		Average TEUI Savings	Range of TEUI Savings	Average TEDI Savings	Range of TEDI Savings
MURB (high- and low-rise)	Step 2	24%	6% to 40%	42%	16% to 58%
	Step 3	31%	17% to 46%	56%	30% to 71%
Office	Step 2	24%	21% to 26%	50%	38% to 63%
	Step 3	40%	37% to 42%	67%	59% to 75%
Retail	Step 2	-1%	-10% to 9%	19%	-9% to 53%
	Step 3	24%	17% to 36%	41%	9% to 68%
Hotel	Step 2	39%	34% to 43%	56%	38% to 69%
	Step 3	48%	45% to 52%	65%	58% to 73%

Additional archetype-by-archetype exploration of the NECB 2015, 2020, and Step levels is below.

MURBs

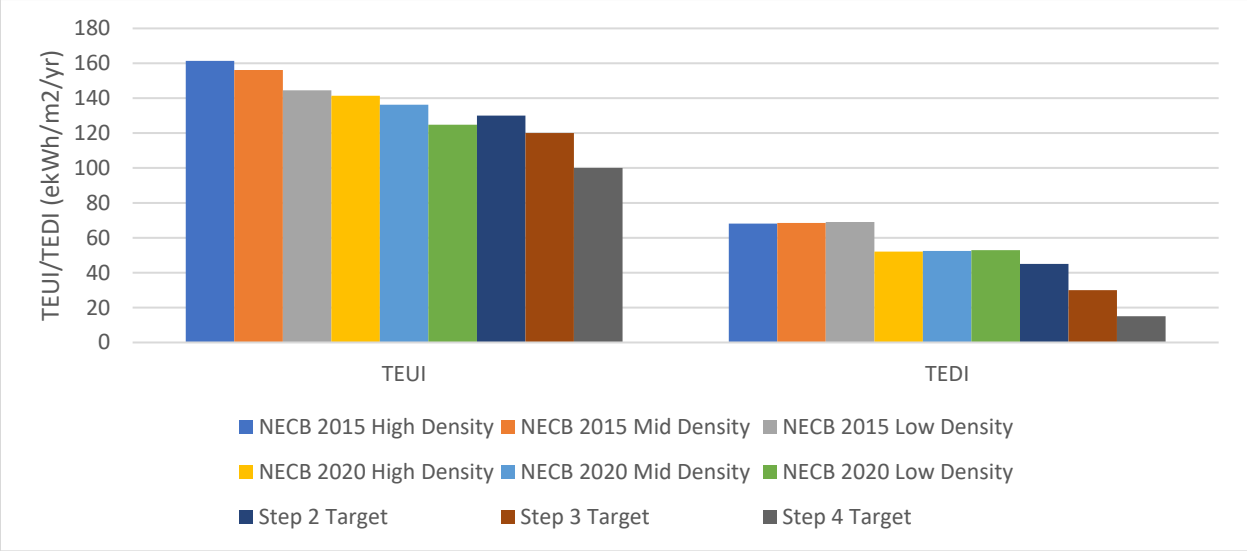


Figure 6-1. Comparison of NECB 2015 and 2020 and current targets for Baseboard MURBs in Climate Zone 4

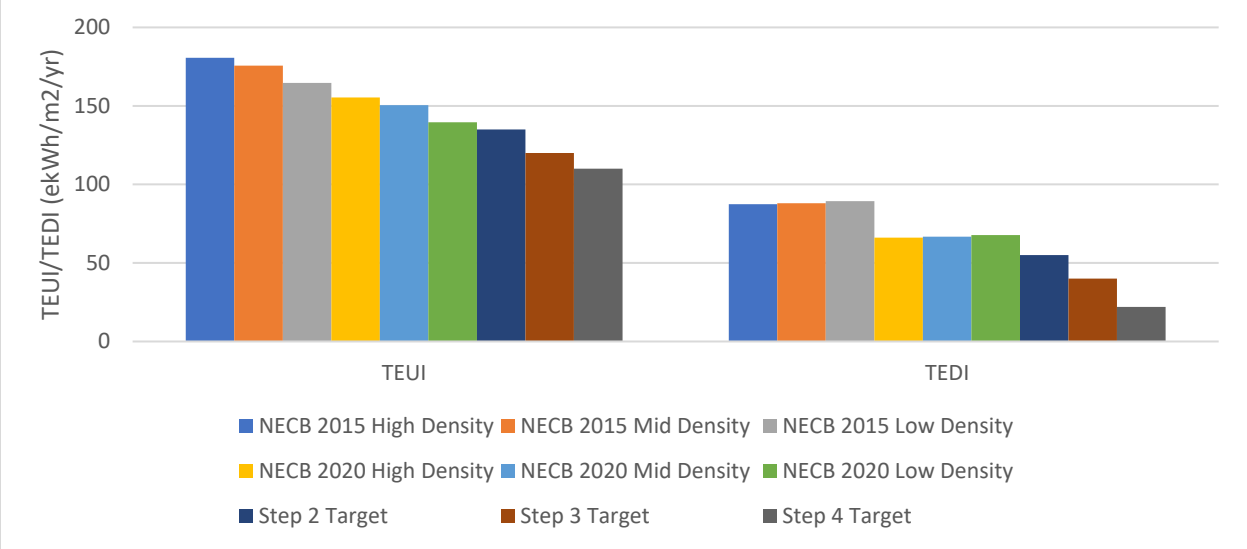


Figure 6-2. Comparison of NECB 2015 and 2020 and current targets for Baseboard MURBs in Climate Zone 7a

The above figure looks at the difference between the current targets for climate zones 4 and 7a, and the updated NECB 2015 and 2020 MURB baseline models. It uses the high-rise MURB archetype with electric baseboards, at VFAR 0.6 (the scenario shown for high-rise MURB in Section 8.5 of the 2018 Metrics Report), and with a range of densities, from smaller unit sizes to larger unit sizes. As noted elsewhere in the current report, the energy results for the high-rise and low-rise (6-storey) MURB are the same and the same targets apply for both; the costs differ as we look at wood frame construction for the low-rise MURB and non-combustible construction for the high-rise MURB.

For climate zone 4, the figure shows that the TEUIs for NECB 2020 for MURBs are approximately 20 ekWh/m²/year lower than the comparable density case for the NECB 2015 TEUI, approximately a 12-14% decrease. In all but the lowest density case, NECB 2020 TEUIs are higher than the Step 2 target TEUI. In the lowest density case, the NECB 2020 TEUI is higher than the Step 3 target.

For TEDI in climate zone 4, the NECB 2020 for MURBs is approximately a 16 ekWh/ m²/year reduction compared with NECB 2015, representing approximately a 23% drop. All NECB 2020 TEDIs are higher than the Step 2 target. In climate zone 7a, a similar pattern is seen, with reductions from NECB 2015 to NECB 2020, then to Steps 2, 3, and 4.

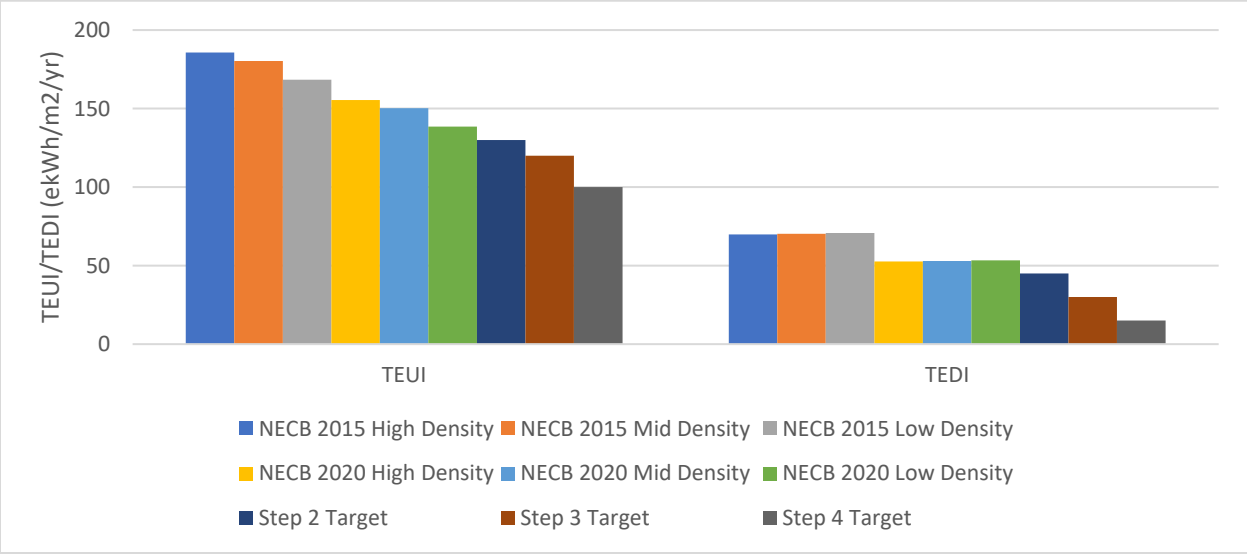


Figure 6-3. Comparison of NECB 2015 and 2020 and current targets for fan coil MURBs in Climate Zone 4

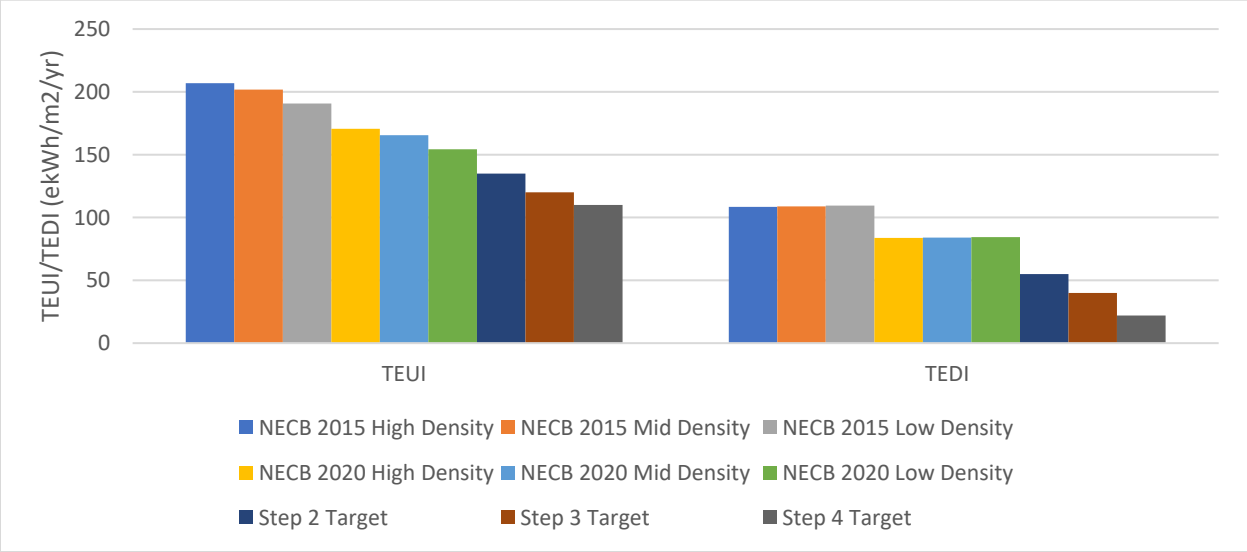


Figure 6-4. Comparison of NECB 2015 and 2020 and current targets for fan coil MURBs in Climate Zone 7a

In the case of the MURB archetype that uses fan coils as the mechanical system rather than electric baseboards, the baseline TEUI increases compared with the baseboard case due to added fan power and added heating (this can be offset in actual design by design elements such as ECM fans and central ASHP heating.) In all cases for the fan coil baseline model, the NEBC 2020 TEUIs and TEDIs are lower than NECB 2015 but higher than Step 2.

Our recommendation for MURBs is to use Step 2 targets as the new minimum. The Step 2 targets meet the criteria of having lower TEUI and TEDI than the NECB 2020 models, for all of the variations in occupancy modeled.

Offices

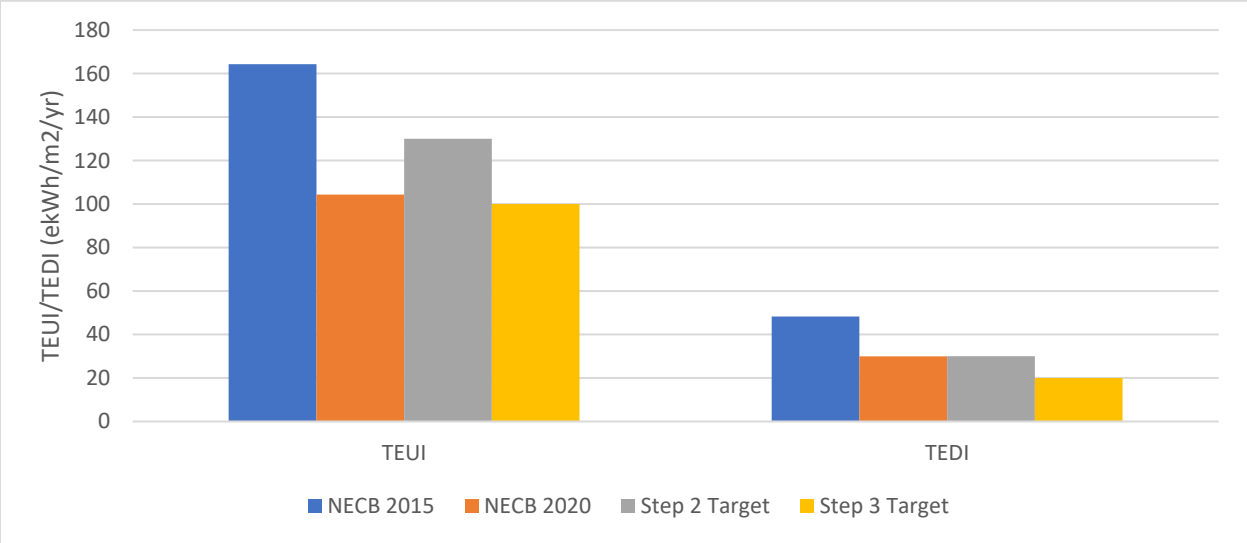


Figure 6-5. Comparison of NECB 2015 and 2020 and current targets for offices with default occupancy for Climate Zone 4.

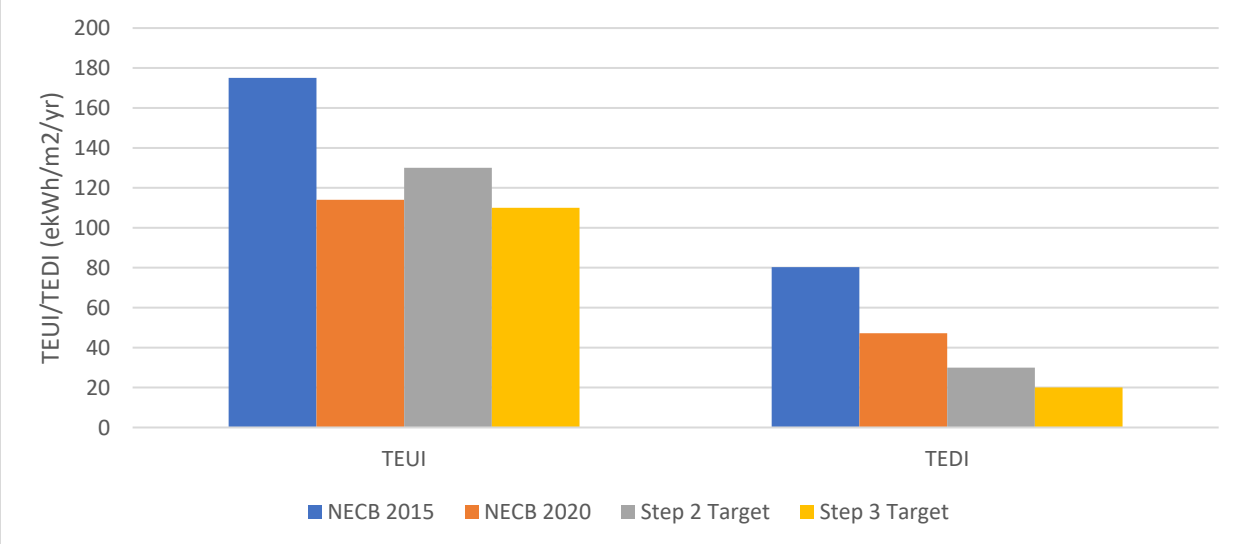


Figure 6-6. Comparison of NECB 2015 and 2020 and current targets for offices with default occupancy for Climate Zone 7a

For the office with typical occupancy, there is a significant drop in TEUI between NECB 2015 and 2020. This is due to reductions in heating and cooling, combined with smaller reductions in lighting and fans. Approximately 3/4 of the heating energy reduction is due to the addition of a warmest reset control and the change to no longer require a 2 L/s/m^2 minimum in NECB 2020. These two changes also account for approximately half of the reduction in cooling. Other changes between the two include envelope improvements as well as reductions in lighting power, which will both affect heating and cooling.

The TEUI of the NECB 2020 minimum is slightly above that of Step 3 but well below the Step 2 target. TEDI has dropped by 18 ekWh/m^2/year between NECB 2015 and 2020; this represents approximately a 38% drop. The TEDI of the NECB 2020 baseline is 30, equal to the Step 2 target.

Our recommendation for offices is to use Step 2 targets as the new minimum. Designs meeting Step 2 targets would generally meet NECB 2020 in terms of either the EUI or the TEDI, though some exceptions were noted. It should be noted that NECB compliance is based on total energy use rather than TEDI, so if the Province requires further confidence that NECB compliance via the performance path could be met, TEUI should be the deciding factor. However, TEDI is a significant metric within the BC Energy Step Code, and our proposed approach has balanced the two metrics. It should also be noted that projects that have variations in shape, size, and occupant density, may have limitations in being able to achieve higher Steps compared with the archetypes modeled in this report. An incremental approach of increasing the minimum by a single Step is therefore recommended.

Retail

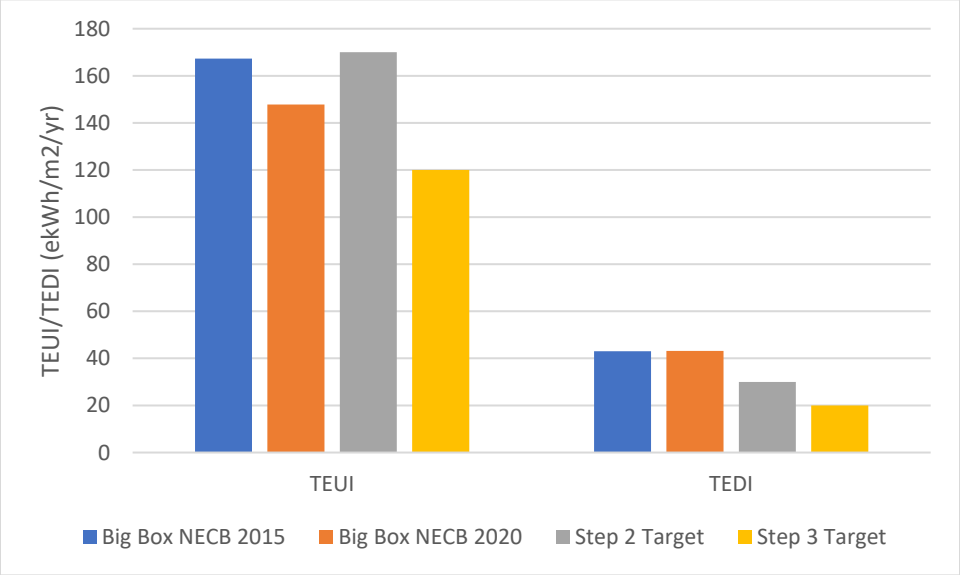


Figure 6-7. Comparison of NECB 2015 and 2020 and current targets for big box retail for Climate Zone 4.

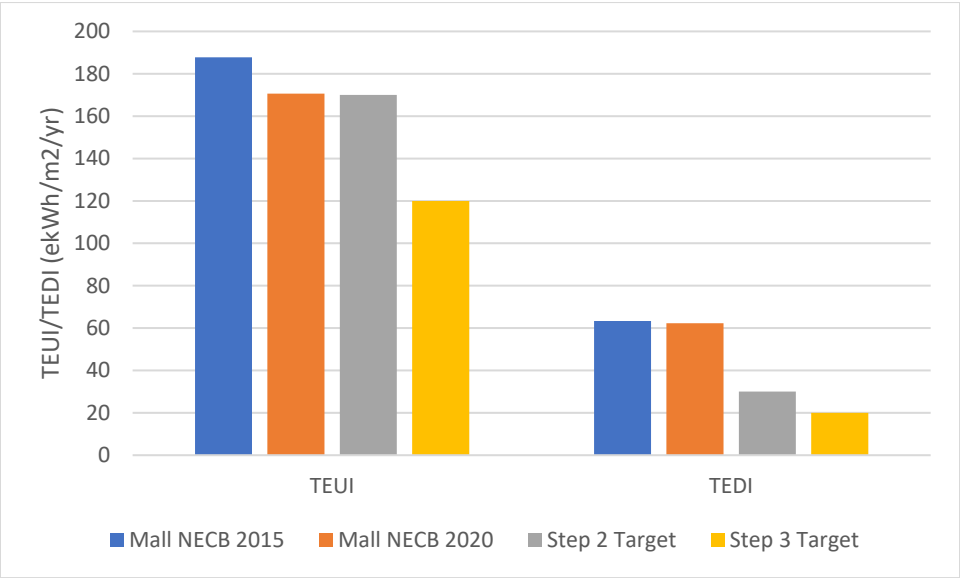


Figure 6-8. Comparison of NECB 2015 and 2020 and current targets for mall for Climate Zone 4.

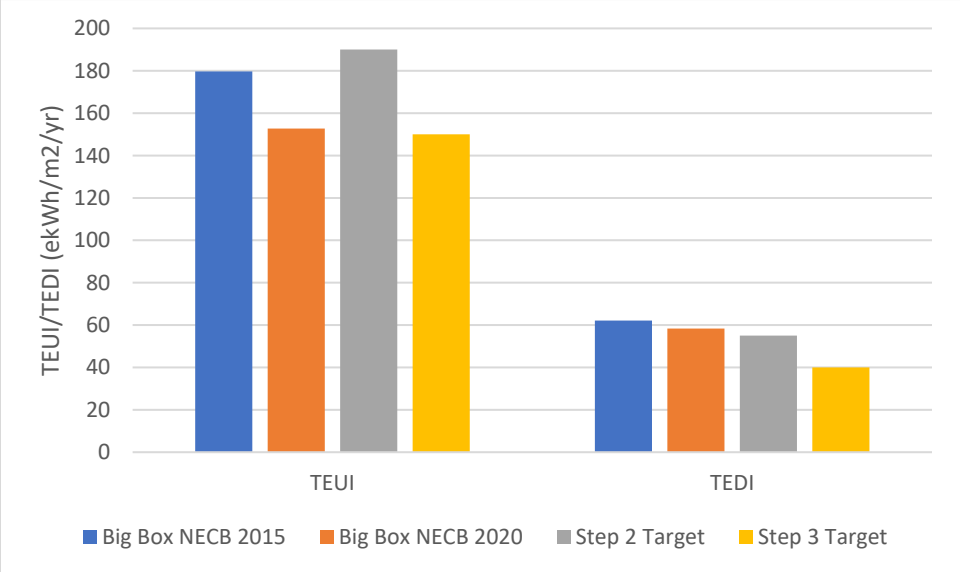


Figure 6-9. Comparison of NECB 2015 and 2020 and current targets for big box retail for Climate Zone 7a.

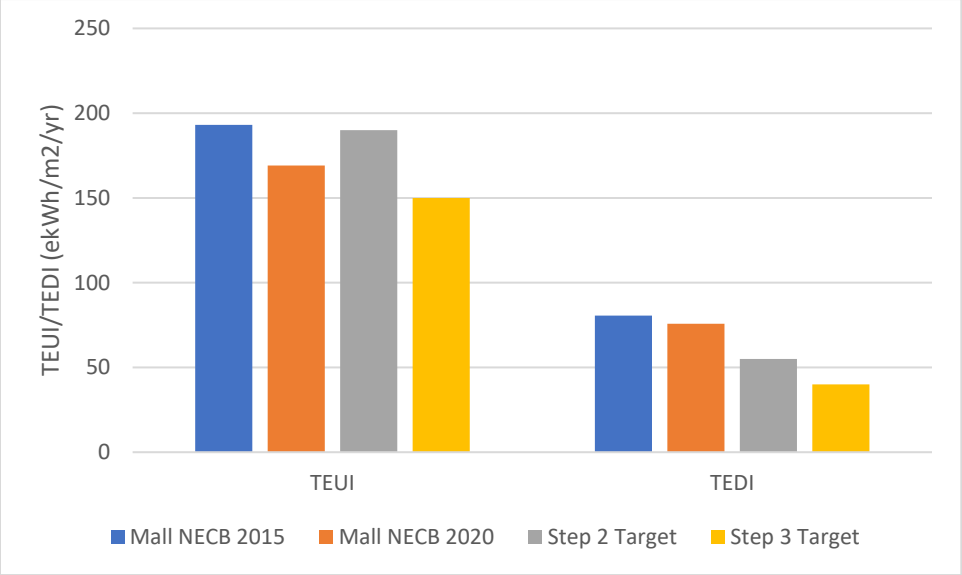


Figure 6-10. Comparison of NECB 2015 and 2020 and current targets for mall for Climate Zone 7a.

In all but one case shown above for retail, the TEUI for NECB 2020 falls between Steps 2 and 3, and the TEDI is higher than Step 2. In the other case shown above, the TEUI is almost identical to Step 2 (171 vs 170). The TEDI has slight reductions between NECB 2015 and 2020, while TEUI is reduced, primarily due to reduced lighting power density and improvements in heating efficiency.

As with the office, our recommended approach for retail is to set the new minimum to Step 2. The reasoning is similar to that for offices: either the TEDI or the TEUI for an NECB 2020 baseline must be beat in order to meet Step 2 targets. As above, our proposed approach looks at both TEDI and TEUI; NECB would look only at total energy use and the Province could prioritize this if required. Also similar to offices, shape factor, size, and other program variations may impact ability of particular buildings to achieve significantly higher targets and an incremental approach is recommended.

Hotel

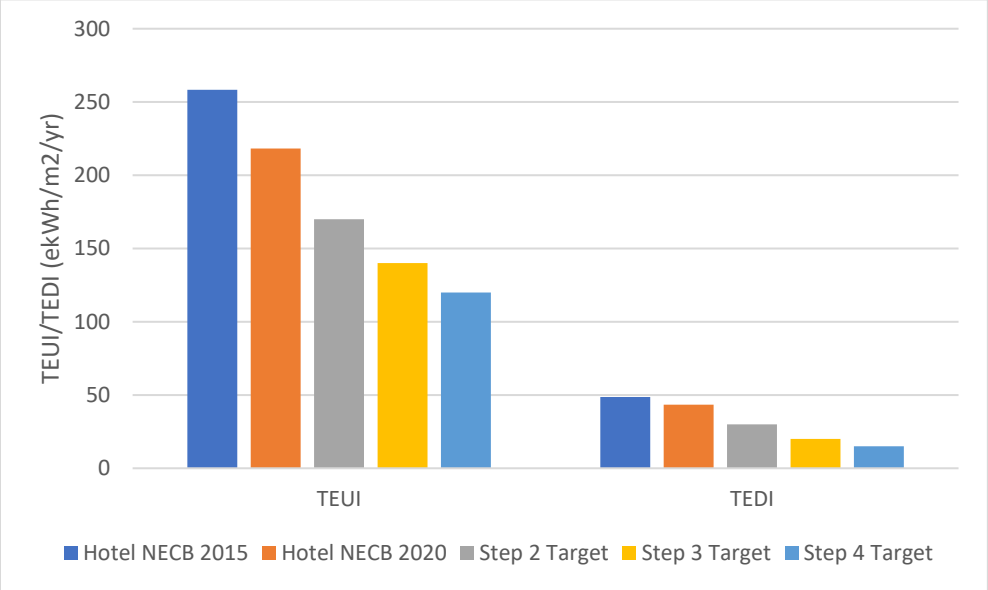


Figure 6-11. Comparison of NECB 2015 and 2020 and current targets for Hotel for Climate Zone 4

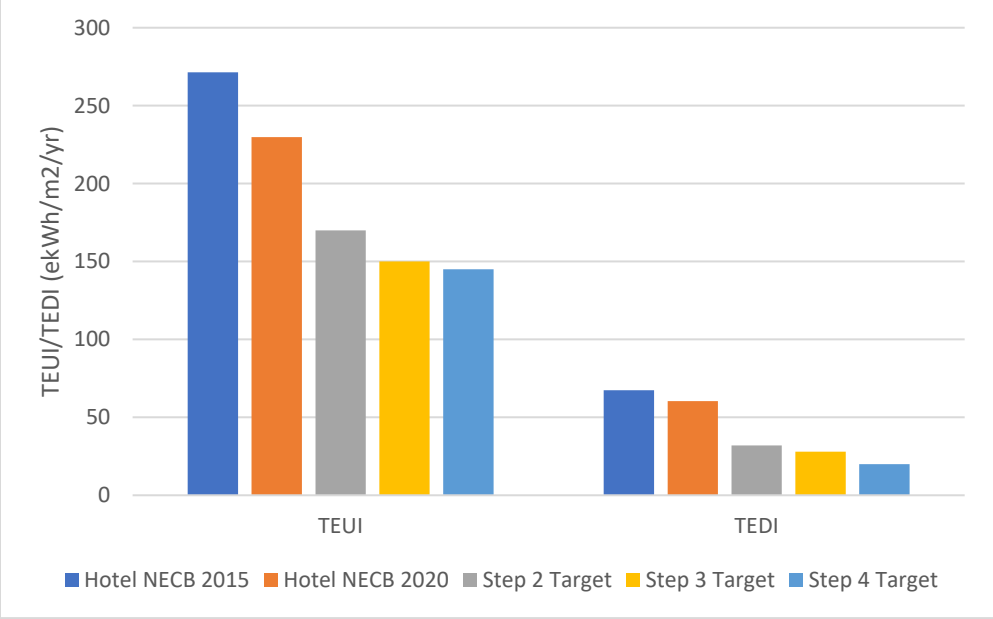


Figure 6-12. Comparison of NECB 2015 and 2020 and current targets for Hotel for Climate Zone 7a

For climate zone 4, hotel TEUI drops by approximately 15%, while TEDI drops by approximately 10%, from NECB 2015 to NECB 2020. The Step 2 targets fall 22% and 30%, respectively, below the NECB values. This allows for on-site laundry, pool, and commercial kitchen, as was done in the 2018 Metrics Report. The climate zone 7a results show a similar pattern, with reductions from NECB 2015 to 2020, and further reductions into Steps 2 to 4.

Our recommended approach for hotels is to set the minimum to Step 2. As with other archetypes, Step 2 targets would require improvements beyond the NECB 2020 minimum; in the case of hotels this is true for both TEUI and TEDI based on the archetype modelling conducted.

Summary of % Difference

The NECB baselines in the study have some range of variation, even within the same archetype, due to changes in program (e.g. big box retail vs mall), or changes in mechanical systems (e.g. boiler vs ASHP). Further, the TEUI and TEDI differentials between the baselines may not be consistent – one NECB 2020 baseline may have 15% better TEUI but 30% better TEDI than NECB 2015, or vice-versa. The tables below summarize the percentage differences between NECB 2015, 2020, and Steps 2 and 3. Example climate zones 4 and 7a are shown below.

In updating to NECB 2020 from NECB 2015 as the base code, the base code becomes more efficient, with average energy performance increases of:

12% for retail

11% for hotel

33% for office

15% for MURB

The detailed breakdown of the different scenarios modeled is shown in the table below.

Table 6-4. MURB Percentage variation between NECB 2015, 2020, and Steps 2 and 3

CZ	Archetype	Occ Dens.	HVAC	TEUI (kWh/m²/yr)	TEDI (kWh/m²/yr)	GHGI (kgCO₂e/m²/yr)	% TEUI Savings	% TEDI Savings	% GHGI Savings	TEUI vs Step 2	TEDI vs Step 2	TEUI vs Step 3	TEDI vs Step 3
4	MURB Boiler FC NECB 2015	High	FC + Boiler	185.7	69.9	20.3							
	MURB Boiler FC NECB 2015	Mid	FC + Boiler	180.3	70.3	19.6							
	MURB Boiler FC NECB 2015	Low	FC + Boiler	168.4	70.8	17.9							
	MURB Boiler FC NECB 2020	High	FC + Boiler	155.4	52.6	16.4	16%	25%	19%	120%	117%	130%	175%
	MURB Boiler FC NECB 2020	Mid	FC + Boiler	150.2	52.9	15.6	17%	25%	20%	116%	118%	125%	176%
	MURB Boiler FC NECB 2020	Low	FC + Boiler	138.5	53.4	13.9	18%	25%	22%	107%	119%	115%	178%
	MURB ASHP FC NECB 2015	High	FC + ASHP	153.0	69.9	11.9							
	MURB ASHP FC NECB 2015	High	FC + ASHP	147.4	70.3	11.1							
	MURB ASHP FC NECB 2015	High	FC + ASHP	135.2	70.8	9.3							
	MURB ASHP FC NECB 2020	High	FC + ASHP	133.0	52.6	10.6	13%	25%	11%	102%	117%	111%	175%
	MURB ASHP FC NECB 2020	High	FC + ASHP	127.6	52.9	9.8	13%	25%	12%	98%	118%	106%	176%
	MURB ASHP FC NECB 2020	High	FC + ASHP	115.6	53.4	8.0	14%	25%	14%	89%	119%	96%	178%
	MURB BB NECB 2015	High	BB	161.4	68.1	1.8							
	MURB BB NECB 2015	Mid	BB	156.2	68.5	1.7							
	MURB BB NECB 2015	Low	BB	144.5	69.1	1.6							
	MURB BB NECB 2020	High	BB	141.4	52.1	1.6	12%	24%	12%	109%	116%	118%	174%
	MURB BB NECB 2020	Mid	BB	136.2	52.4	1.5	13%	23%	13%	105%	116%	114%	175%
	MURB BB NECB 2020	Low	BB	124.8	52.9	1.4	14%	23%	14%	96%	118%	104%	176%

CZ	Archetype	Occ Dens.	HVAC	TEUI (kWh/m²/yr)	TEDI (kWh/m²/yr)	GHGI (kgCO₂e/m²/yr)	% TEUI Savings	% TEDI Savings	% GHGI Savings	TEUI vs Step 2	TEDI vs Step 2	TEUI vs Step 3	TEDI vs Step 3
7a	MURB Boiler FC NECB 2015	High	FC + Boiler	206.9	108.5	21.5							
	MURB Boiler FC NECB 2015	Mid	FC + Boiler	201.9	108.9	20.9							
	MURB Boiler FC NECB 2015	Low	FC + Boiler	190.7	109.5	19.4							
	MURB Boiler FC NECB 2020	High	FC + Boiler	170.6	83.7	16.7	18%	23%	22%	126%	186%	142%	209%
	MURB Boiler FC NECB 2020	Mid	FC + Boiler	165.5	84.0	16.1	18%	23%	23%	123%	187%	138%	210%
	MURB Boiler FC NECB 2020	Low	FC + Boiler	154.3	84.4	14.6	19%	23%	25%	114%	187%	129%	211%
	MURB ASHP FC NECB 2015	High	FC + ASHP	171.6	108.5	12.4							
	MURB ASHP FC NECB 2015	High	FC + ASHP	166.0	108.9	11.6							
	MURB ASHP FC NECB 2015	High	FC + ASHP	153.7	109.5	9.9							
	MURB ASHP FC NECB 2020	High	FC + ASHP	147.6	83.7	10.8	14%	23%	13%	109%	186%	123%	209%
	MURB ASHP FC NECB 2020	High	FC + ASHP	142.1	84.0	10.0	14%	23%	14%	105%	187%	118%	210%
	MURB ASHP FC NECB 2020	High	FC + ASHP	130.0	84.4	8.3	15%	23%	16%	96%	187%	108%	211%
	MURB BB NECB 2015	High	BB	180.6	87.4	8.7							
	MURB BB NECB 2015	Mid	BB	175.7	88.1	7.9							
	MURB BB NECB 2015	Low	BB	164.6	89.3	6.1							
	MURB BB NECB 2020	High	BB	155.4	66.2	8.5	14%	24%	3%	115%	147%	130%	165%
	MURB BB NECB 2020	Mid	BB	150.5	66.7	7.6	14%	24%	4%	111%	148%	125%	167%
	MURB BB NECB 2020	Low	BB	139.5	67.8	5.8	15%	24%	5%	103%	151%	116%	169%

Table 6-5. Office Percentage variation between NECB 2015, 2020, and Steps 2 and 3

CZ	Archetype	Occ Density	TEUI (kWh/m²/yr)	TEDI (kWh/m²/yr)	GHGI (kgCO₂e/m²/yr)	% TEUI Savings	% TEDI Savings	% GHGI Savings	TEUI vs Step 2	TEDI vs Step 2	TEUI vs Step 3	TEDI vs Step 3
4	Office NECB 2015	Low	164.3	48.3	15.1							
	Office NECB 2020	Low	104.3	30.0	9.6	37%	38%	36%	80%	100%	104%	150%
	Office NECB 2015	High	183.1	40.8	15.2							
	Office NECB 2020	High	125.9	26.5	10.6	31%	35%	31%	97%	88%	126%	133%
7a	Office NECB 2015	Low	175.1	80.3	18.7							
	Office NECB 2020	Low	114.0	47.2	11.1	35%	41%	41%	88%	157%	104%	236%
	Office NECB 2015	High	192.3	73.6	18.8							
	Office NECB 2020	High	133.7	43.9	11.7	30%	40%	38%	103%	146%	122%	220%

Table 6-6. Hotel Percentage variation between NECB 2015, 2020, and Steps 2 and 3

CZ	Archetype	Laundry Fuel	TEUI (kWh/m²/yr)	TEDI (kWh/m²/yr)	GHGI (kgCO₂e/m²/yr)	% TEUI Savings	% TEDI Savings	% GHGI Savings	TEUI vs Step 2	TEDI vs Step 2	TEUI vs Step 3	TEDI vs Step 3
4	Hotel NECB 2015	NG	258.3	48.7	2.8							
	Hotel NECB 2020	NG	218.3	43.4	2.4	11%	15%	15%	128%	145%	156%	217%
	Hotel NECB 2015	Elec	258.3	48.7	2.8							
	Hotel NECB 2020	Elec	218.3	43.4	2.4	11%	15%	15%	128%	145%	156%	217%
7a	Hotel NECB 2015	NG	271.4	67.4	31.5							
	Hotel NECB 2020	NG	229.8	60.4	26.5	10%	16%	16%	135%	201%	158%	242%
	Hotel NECB 2015	Elec	271.4	67.4	36.3							
	Hotel NECB 2020	Elec	229.8	60.4	31.2	10%	14%	14%	135%	201%	158%	242%

Table 6-7. Retail Percentage variation between NECB 2015, 2020, and Steps 2 and 3

CZ	Archetype	Building type	TEUI (kWh/m²/yr)	TEDI (kWh/m²/yr)	GHGI (kgCO₂e/m²/yr)	% TEUI Savings	% TEDI Savings	% GHGI Savings	TEUI vs Step 2	TEDI vs Step 2	TEUI vs Step 3	TEDI vs Step 3
4	Retail NECB 2015	Big Box	167.3	43.0	13.2							
	Retail NECB 2020	Big Box	147.8	43.2	13.1	12%	0%	1%	87%	144%	123%	216%
	Retail NECB 2015	Mall	187.8	63.3	19.0							
	Retail NECB 2020	Mall	170.6	62.3	18.6	9%	2%	2%	100%	208%	142%	311%
7a	Retail NECB 2015	Big Box	179.7	62.1	14.0							
	Retail NECB 2020	Big Box	152.7	58.3	12.7	15%	6%	9%	80%	106%	102%	146%
	Retail NECB 2015	Mall	193.1	80.6	18.4							
	Retail NECB 2020	Mall	169.1	75.7	16.9	12%	6%	8%	89%	138%	113%	189%

6.1.2 Program Variation Impacts

Office IT Loads

IT loads such as servers can impose a significant load on the overall energy use (TEUI) of the building. Such loads can be designed to have minimal impacts on TEDI and GHGI, by isolating them from other areas of the building such that a targeted cooling system provides cooling to server rooms rather than relying on the overall building system.

Both the load and the building size will influence the TEUI impact. Unlike many design elements, building size and IT load are not correlated. A small office building housing a call centre would be likely to have a very high IT load and very high TEUI as a result. A larger office housing engineering firms may have no concentrated server loads.

As an example, a 40 kW IT load was added to the archetype office, along with a dedicated cooling system, and resulted in an EUI increase of 27. Depending on the deficit imposed and level of performance targeted, it may be possible to make up such an increase using envelope, mechanical, and lighting measures discussed in this study; as one example the difference between R-20 walls, USI-0.8 windows, half of code infiltration rate, and ASHP, would make up a 27 TEUI difference between that scenario and one using R-4 walls, USI-2.5 windows, code infiltration, and condensing boilers.

In terms of target setting in the context of NECB 2020, an office with an IT load would increase the TEUI of the baseline. In our example above, an increase of 27 TEUI would mean that the NECB 2020 baseline with IT load would be higher than the Step 2 targets in all of the cases shown in Section 6.1.1, and would require ECMs to meet Step 2 targets. This supports the incremental approach suggested in Section 6.1.1 to set Step 2 as the new minimum target. Step 2 could still be readily achieved using reasonable ECMs; Step 3 is still barely achievable for our study archetype with significant ECMs, however there is concern about the potential impacts for buildings with less favorable shapes or sizes.

Shape and Massing of MURBs (VFAR)

The shape and massing of multi-unit residential buildings was discussed in depth in the 2018 Metrics Report, and was noted to have a significant impact on TEDI and energy use. This shape factor is measured as the “vertical surface to floor area ratio” or VFAR. VFAR focusses on the vertical surface area rather than the total surface area, as in the BC context for MURB buildings, most heat loss occurs in the vertical surface areas.

Building codes that use reference or baseline buildings, such as NECB and ASHRAE, render the shape factor compliance neutral by using a reference building with the same geometry as the proposed. However, for an absolute target based code like the BC Energy Step Code, the form factor of the building can be optimized to improve performance (or can make the targets more difficult to achieve for a poor performing form factor).

The 2018 Metrics Report found that for a sample of high- and low-rise MURBs in BC and across Canada, most projects fell within the range of 0.5 to 0.65 VFAR. Floor plate size and level of articulation were found to be the principal factors affecting VFAR.

The following graphic from the 2018 Metrics Report shows the impact of VFAR, with other design elements held constant for a Step 2 MURB. The impact of doubling VFAR, from 0.5 to 1, more than doubles the TEDI. If VFAR of 0.6 is considered as typical, reducing VFAR to 0.5 would allow 20% TEDI savings. Design measures to be considered here include more compact or square shapes, reduced articulation, and larger floorplates.

Consistent with the 2018 report, the results in this study use VFAR 0.6 for MURBs.

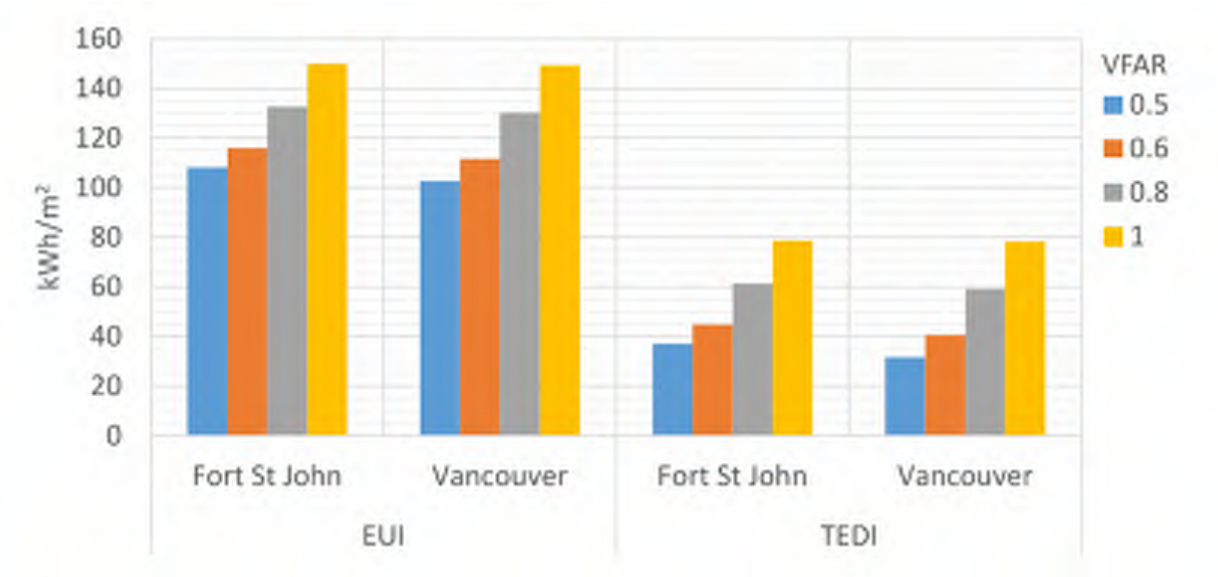


Figure 6-13. Energy and TEDI Impacts of VFAR in MURBs (source: 2018 Metrics Report)

6.1.3 Impact of GHG/GHGI Targets – Part 3

A separate detailed data collection report has been developed based the modelling developed for this Metrics report, and is attached as Appendix D, including detailed analysis of each climate zone, Step, and archetype, as well as a summary of assumptions.

Key highlights are reproduced below.

The preliminary proposed approach based on that analysis is to set three target levels for Part 3 buildings:

- Medium: intended to require decarbonization of one major system (space heating or hot water).
- Low: intended to require both major systems to decarbonize, but still allows for high-carbon fuel backup heating, cooking loads, or similar.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

Each GHG target is set at a level which drives a technology or design choice towards lower carbon fuels.

The targets are set using an intensity metric, similar to the existing TEUI and TEDI Step Code metrics, which scale by floor area. Part 3 buildings vary widely in size, and their energy use generally tracks with size (i.e. there is not a substantial portion of fixed loads that stay the same regardless of size).

The preliminary proposed targets used for analysis are:

Table 6-8. Preliminary Proposed GHGI Targets for Part 3 Buildings

Archetype	Medium	Low	Zero Carbon Ready
MURB	7	3	1.8
Office	5	3	1.5
Retail	6	3	2
Hotel	9	4	2

Initial discussion on targets centered around a 6/3/1 set of targets. This format is generally adhered to, however some changes for individual archetypes have been suggested above to better target the desired level of decarbonization measures, while remaining achievable without requiring renewables such as solar photovoltaics.

First, targets are analyzed based on a simple spreadsheet calculation using the existing Step Code TEUI and TEDI targets, combined with domestic hot water usage modeled in the archetype models. Using these existing targets, and assigning heating and DHW to a high-carbon fuel as an initial baseline (and assuming a 95% condensing boiler for heating), and assuming the rest of the energy use allowable in the TEUI uses a low-carbon fuel, the following GHGI values (in kgCO2e/m^2/year) are seen. This could be considered a "typical worst case" as it uses the maximum allowable TEUI and TEDI for each Step; many projects would be expected to be below those maximums in reality.

The initial targets are set using an allowance based on these maximums, then validated against archetype modelling, described below.

This analysis is summarized below, with levels that would be achieved with each decarbonization measure shown shaded in green.

<u>Target levels</u>

- Each Step and climate zone shows an option to use decarbonization to meet proposed targets at the appropriate decarbonization measures and Steps. In general, targets appear to generate the desired outcomes.
- Ability to meet targets does not appear to depend substantially on climate zone but rather on employing effective use of low-carbon fuels. As such and for simplicity, we have proposed a single set of targets for all climate zones.
- Buildings which fully decarbonize would meet the currently proposed zero carbon ready targets. None would meet the initially proposed target of 1 $kgCO_2e/m^2$/year; significant TEUI savings (up to 50% below Step 2 and nearly 40% below Step 4), or use of

renewable energy generation such as PV or wind power would be required if a target of 1 was set. This generally holds true in archetype modelling though the office archetype does show some high-efficiency options that would meet a GHGI of 1. All other archetypes do not.

- Office archetype modelling showed several instances of designs with high-carbon backup heating falling into the zero carbon ready targets, and was therefore reduced to 1.5 rather than matching other archetypes at a level of 2. Other archetypes may show similar outcomes in some cases but may have difficulty meeting 1.5 in colder climate zones.

Impact of Steps

- This analysis also shows the generalized impact of increasing the Step on decarbonization.
- Targeted decarbonization measures have significantly greater impact on GHG savings, compared with much smaller impact from TEUI/TEDI Steps. When increasing Steps without employing targeted decarbonization measures, the carbon savings range from 12% - 30%. The use of decarbonization measures within the same energy Step is in the range of 76% - 92%.

While moving to a higher energy Step for a particular project may assist in meeting thresholds where they are close, it is not expected to typically be the major driving factor of decarbonization measures selected or the number of decarbonization measures required.

Legend:
Medium
Low
Zero-Carbon Ready

Table 6-9. GHGI Impacts by Step and Climate Zone Based on Existing TEDI and TEUI Targets

GHGI (kgCO2e/m2/year)	Climate Zone	Step	DHW + Heat High Carbon Fuel	Heat Decarb	DHW Decarb	Fully Decarb
Office	4 - 7a	2	9.1	3.6	6.9	1.4
		3	6.9	3.2	4.8	1.1
Retail	4	2	7.8	2.3	7.4	1.9
		3	5.5	1.8	5.0	1.3
	5	2	7.8	2.3	7.4	1.9
		3	6.4	1.8	6.0	1.4
	6	2	10.6	2.3	10.1	1.9
		3	7.4	1.9	6.9	1.4
	7a	2	12.6	2.6	12.2	2.1
		3	9.4	2.1	9.0	1.7
Hotel/ Motel	4	2	20.7	15.2	7.4	1.9
		3	18.5	14.8	5.2	1.5
		4	17.4	14.6	4.1	1.3
	5	2	20.7	15.2	7.4	1.9
		3	18.7	14.9	5.4	1.6
		4	17.7	14.7	4.4	1.4
	6	2	20.7	15.2	7.4	1.9
		3	19.5	14.9	6.2	1.6
		4	18.0	14.7	4.7	1.4
	7a	2	21.0	15.2	7.7	1.9
		3	20.1	14.9	6.8	1.7
		4	18.5	14.9	5.3	1.6
Other Residential (Part 3)	4	2	15.4	7.1	9.7	1.4
		3	12.5	7.0	6.8	1.3
		4	9.5	6.8	3.8	1.1
	5	2	15.4	7.1	9.7	1.4
		3	13.4	7.0	7.7	1.3
		4	10.9	6.9	5.2	1.2
	6	2	16.3	7.2	10.6	1.5
		3	13.4	7.0	7.7	1.3
		4	10.9	6.9	5.2	1.2
	7a	2	17.2	7.2	11.6	1.5
		3	14.3	7.0	8.6	1.3
		4	10.9	6.9	5.2	1.2
	7b	2	18.3	7.3	12.6	1.7
		3	16.4	7.2	10.7	1.5
		4	13.5	7.1	7.8	1.4
	8	2	24.1	7.7	18.5	2.0
		3	21.2	7.4	15.5	1.8
		4	18.2	7.2	12.5	1.5

Renewable Natural Gas

Using renewable natural gas (RG or RNG) can lower the carbon emissions of a building compared to conventional natural gas.

This document includes an analysis illustrating the potential blend of renewable gas (RG or RNG) required to achieve the same stepped GHGI targets if all-gas equipment were used.

The annual modelled utility cost of RNG assumes an unlimited supply and is based on rates accurate at the time of publishing.

The archetype examples below focus primarily on electrification decarbonization measures; the energy and cost implications for these measures are more complex and require significant analysis to understand.

Renewable natural gas (RNG) decarbonization measures are much simpler from an analysis perspective:

- Use of RNG does not require changes to natural gas baseline equipment and therefore do not incur incremental capital costs.
- Utility cost of RNG in the analysis ends up cost neutral with natural gas once escalating carbon taxes over a 20-year period are accounted for
- Thus, RNG becomes a simple 1:1 substitution for the modeled base case, which is typically natural gas.
- The main issue considered is therefore what blend of RNG, as a percentage of total natural gas, would be sufficient to meet GHG targets? This is shown below.

The percentage of RNG required to meet targets is shown as a range because it will typically depend on the climate zone, with warmer climate zones requiring a lower percentage and colder climate zones requiring a higher percentage. The percentage required will vary with project specifics and design, for example a design that reduces natural gas heating loads would require a lower percentage of RNG. The below should be considered as a non-exhaustive example only. The below uses Step 2 as a base case.

Table 6-10. RNG as a Percentage of Total Natural Gas Required to Meet Targets

Archetype	% RNG to meet Medium GHG Target	% RNG to meet Low GHG Target	% RNG to meet Zero-Carbon Ready GHG Target
MURB (high and low rise)	50% - 70%	75% - 85%	90% – 95%
Office	50%	75%	95%
Retail	30% - 60%	75% - 85%	90% – 95%
Hotel	60%	85% - 90%	95% - 97%

Archetype Analysis

The tables included in the detailed analysis (included as Appendix D of this report) contain examples of modeled greenhouse gas emissions for a particular archetype, location, and set of design measures. The "base case" within the table uses a high-carbon fuel and approximately Step 2 design measures (envelope, heat recovery) to set an initial baseline prior to decarbonization. Decarbonization measures are then applied to heating and domestic hot water, separately and in combination. This is not an exhaustive list of options to meet targets but is meant to demonstrate a few example points, with key metrics including incremental capital cost, utility cost, and the GHG target level achieved.

Targets Achieved

Each archetype shows at least one fully decarbonized, zero carbon ready option.

- Designs using one decarbonization measure generally meet medium targets, as expected. In some cases a particular measure (either heating or DHW) must be used.
- Designs using high-carbon backup heating fuel, coupled with low-carbon heating system as the primary heating supply, generally achieve the Low target, as expected. There are some cases where they meet either Medium or Zero Carbon ready; these targets fall into a narrow range with some overlap.

Cost Impacts

- Costs for decarbonization remain within 2.5% for all archetypes modelled, to reach Zero Carbon Ready.
- The cost difference between decarbonization measures for climate zone 7a versus 4 is consistently between 0.2% - 0.3% across all archetypes considered. This is further discussed below but suggests a bookending approach to Part 3 decarbonization cost considerations and modelling is appropriate.

Mixed Use Buildings

- Mixed use buildings have not been modeled within these data sheets; it is anticipated that they would follow the procedure outlined in the City of Vancouver Energy Modelling Guidelines

Impact of Steps

A Step 2 base case as well as the impacts of higher Steps are shown for all archetypes. Key observations from this analysis are summarized here.

- Achieving a higher Step will reduce annual heating loads (TEDI) as well as overall energy (TEUI). This leads to carbon reductions, particularly if the heating is supplied by a high-carbon fuel.
- However, efficiency improvements are not a substitute for targeted decarbonization measures. While projects are likely to employ both in combination to some extent, decarbonization measures and targets require over 30% reductions in carbon between levels, and in many cases greater reductions from typical design to even the Medium target. 30% or greater reduction in energy use beyond Step 2 is significant and would require substantial design interventions (this would mean reducing TEUI from Step 2 to somewhat below Step 4 for a MURB.) On the other hand, employing the use of targeted decarbonization measures including RNG and electrification can readily achieve those levels.
- As such, the GHGI-focused archetype analysis focusses on targeted decarbonization measures, including RNG and electrification measures.
- However, significant impacts for a design employing a higher Step would include:
    - Reduced operating costs (via a reduction in load).
    - Potential for reduced equipment size

The full detailed modelling analysis is reproduced as Appendix D to this report. A single example table is shown below to illustrate the available data.

Low-Rise MURB data tables: Climate Zone 5

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●	●	
Electric baseboard			●		●				●		●				●			●
Air-source heat pump; 30% natural gas backup				●						●				●				
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [i]																		
High efficiency gas (95%)	●		●				●		●				●	●	●			
Electric resistance		●		●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11.6	6.6	6.4	2.9	1.3	1.3	10.4	5.4	6.3	2.5	1.2	1.3	8.1	6.8	6.2	3	1.1	1.8
Annual modelled utility cost ($/m^2)	10.5	11.1	9.7	10.5	10.2	10.2	10	10.6	9.1	10.2	9.7	9.9	9.4	9.1	8.1	10	8.7	9.9
Total ICC vs. base case ($/m^2)	0	0	-3.2	40.3	-3.2	66.7	0	0	-3.1	40.3	-3.1	66.8	0	40.3	-3.2	0	-3.2	40.3
% ICC vs base case	0.0%	0.0%	-0.1%	1.3%	-0.1%	2.1%	0	0.0%	-0.1%	1.3%	-0.1%	2.1%	0.0%	1.2%	-0.1%	0.0%	-0.1%	1.2%
Net present value	11.6	6.6	6.4	2.9	1.3	1.3	Not calculated											

[i] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

6.1.4 Impact of Overheating Risk Analysis

The individual impacts of passive cooling measures on overheated hours can be considered by varying only one measure at a time, as shown below. The measures are not linearly additive when combined but this isolation method can provide an initial understanding of which measures are likely to have the greatest impact.

Passive and active cooling measures can be combined to allow the design to use passive cooling when conditions are favorable, and supplement with active (mechanical) cooling when required, while employing passive cooling to reduce the mechanical cooling needed. The analysis below considers only passive cooling measures, to analyze overheated hours without active cooling.

The base design case used for the table below uses 2020s weather, mid-performance envelope (described in next paragraph), 40% WWR, SHGC 0.4, 18°C night pre-cool, 0.6m overhang, no bypass or boost, no fins, no exterior operable shading, and 5% of window area being operable. The measures are described in more detail in Section 5.2.

For this overheating analysis, envelope thermal performance and air tightness ECMs were combined into a single measure, described as low-, mid-, and high-performance levels. A low-performance envelope would meet Step 2 for a MURB in climate zone 4 for a VFAR of 0.6. A mid-performance envelope would meet Step 2-3 in climate zone 4. A high-performance envelope for this analysis would meet Step 4 in all climate zones, though naturally all of the Step levels would be dependent on additional factors such as shape, window to wall ratio, HRVs, etc.

The envelope measures were held constant across climate zones to avoid confounding the cost impacts of passive cooling measures being focused on in this targeted analysis with the broader Step requirements addressed elsewhere in the report, while still accounting for some potential difference in cooling measure performance between different envelope performance levels.

The impacts of combining passive cooling measures, as well as cost impacts and options to meet various targets, are explored further below; this initial breakdown is simply to develop an understanding of which individual measures are likely to be the most impactful and the sensitivity to a range of inputs, as well as the impacts of similar measures across different climate zones.

Two sets of results are shown. First, hours overheated based on ASHRAE 55 adaptive comfort model 80% acceptability limits, simplified to use average temperatures of calendar months based on methodology used in the City of Vancouver EMG. The ASHRAE 55 limits vary by location, as someone who has experienced a warmer average temperature recently would be expected to have adapted to be comfortable in somewhat warmer temperatures. This methodology is described in more detail in Section 5.2.

The second set of results simply totals hours where the modeled indoor temperature is over 26°C, and does not vary by location, allowing a more straightforward illustration of hours over a specific and constant threshold.

All overheating results are taken from the worst-case zones in the model from an overheating perspective, determined by examining the maximum number of overheated hours for each zone.

Passive cooling measures and model inputs are described more thoroughly in Section 5.2.

Table 6-11. Single measure impact on overheated hours, with 2020s weather except where noted

Measure/ Variation (High-rise MURB)	Range	CZ4		CZ5		CZ6		CZ7a		CZ7b		CZ8	
		Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C
Base Case Mid-performance envelope, 40% WWR, 0.4 SHGC, 18°C night pre-cool, no HRV bypass or boost, overhang, 5% window operable area, 2020s weather	-	573	656	1584	1683	564	518	704	659	687	795	529	606
Envelope Low = R-4 walls, R-20 roof, USI-2.5 windows, code infiltration Mid = R-10 walls, R-40 roof, USI-2.0 windows, code infiltration High = R-20 walls, R-40 roof, USI-1.2 windows, near-zero infiltration	Low Mid High	529 573 646	612 656 727	1218 1274 1375	1531 1584 1688	523 564 642	482 518 588	660 704 795	617 659 735	650 687 762	746 795 886	500 529 590	572 606 684
Window to wall ratio	20% 40% 60%	246 573 750	364 656 812	1060 1584 1637	1536 1683 1741	379 564 657	338 518 622	494 704 823	461 659 762	475 687 758	534 795 931	353 529 651	386 606 730
Solar Heat Gain Coefficient (SHGC)	0.2 0.4	208 573	314 656	896 1274	1263 1584	303 564	270 518	415 704	393 659	382 687	436 795	293 529	310 606
Night pre-cool** Allows temperature in suite to dip overnight to pre-cool the space for daytime.	18°C 16°C	573 573	656 656	1274 1273	1584 1584	564 565	518 518	704 705	659 659	687 688	795 795	529 529	606 607
HRV Bypass	No Yes	573 469	656 551	1274 1124	1584 1435	564 446	518 418	704 587	659 558	687 576	795 648	529 463	606 520
HRV Boost + Bypass	No 20%	573 445	656 526	1274 1087	1584 1396	564 422	518 422	704 562	659 535	687 549	795 620	529 444	606 496
Exterior Shading Balconies are included in all cases.	Overhang Fin* Movable Shade	573 738 579	656 822 653	1274 1432 1296	1584 1719 1584	564 677 596	518 690 554	704 901 722	659 803 675	687 780 662	795 995 838	529 633 537	606 720 616
Operable windows Percentages of open area are based on a 40% window-to-wall ratio, and absolute open areas are kept constant at other WWRs.	5% 20%	573 79	656 138	1274 650	1584 905	564 205	518 186	704 272	659 257	687 251	795 279	529 145	606 165

Measure/ Variation (High-rise MURB)	Range	CZ4		CZ5		CZ6		CZ7a		CZ7b		CZ8	
		Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C	Hours over ASHRAE 55 (simplified)	Hours over 26°C
Weather Weather files are future-shifted but still "typical weather year" and exclude extreme weather events.	2020s 2050s	573 872	656 1027	1274 1683	1584 1953	564 800	518 759	704 961	659 886	687 900	795 1081	No future weather files available for this location.	

*Fins are modeled relatively conservatively at 6 fins per façade on all facades, spaced widely apart (on average approximately 4m apart); a more optimized design may provide higher impact.

** In some modeled cases night pre-cool has minimal impact as overnight indoor air temperatures stay warmer than 18°C so reducing the setpoint lower has no effect. This measure is expected to be more effective in combination with other measures. Where there are slight differences with lower setpoints leading to 1 hour more this appears to be a rounding difference in the simulation; no actual increase is expected.

It can be seen that the largest individual impacts are from providing significant areas of operable windows including balcony doors, reducing solar heat gains of vision glass, and reduced window to wall ratio.

These measures may have an impact on TEDI, in particular:

- Decreasing solar heat gain coefficient of windows is expected to increase TEDI due to a reduction in available solar heat gains. In some cases SHGC reductions are also tied to improved thermal performance of glazing due to added low-e coatings.
- A wide range of thermal performance options do exist for operable glazing, however operable windows do have lower thermal performance than comparable fixed windows.

The impacts of SHGC on TEDI and TEUI are shown in the main body of the results.

The changes in typical weather years from the 2020s to the 2050s would lead to between a 30% and 60% increase in unmet hours in the base design case, without accounting for either mitigations provided by passive cooling design measures, or increases in unmet hours that may occur due to increased frequency of extreme weather events.

Another point of note is that a significant improvement in envelope thermal performance does increase overheated hours. However, the impact of higher envelope performance is readily compensated for by improving operable windows or other measures. It is possible to both improve envelope thermal performance and reduce overheated hours.

One significant limitation in the effectiveness of operable windows on projects may be the requirement for limiters. Balcony doors tend to provide a much larger open area, however typically other windows on high-rise buildings require and are supplied with limiters which only allow a 100mm opening. Casement or awning windows with a limiter can provide somewhat more open area than a sliding window with a limiter. The impact of limiters on an individual project can vary significantly based on the size of windows, proportion of balcony doors, and type of windows. The model looks at a proportion of total window area that can be opened.

Another significant limitation on many of the passive cooling measures described, including operable windows, night pre-cool, and HRV bypass and boost, is outdoor air temperature. If it is warmer outside than indoors, providing additional outdoor air will not significantly help to cool the space. Night pre-cool is dependent on cooler night-time temperatures, which may not be available in a heat wave.

Heat waves are expected to become more extreme and frequent over time, reducing the effectiveness of these measures at times when they are needed most. Increased frequency and severity of extreme weather is not accounted for in this study.

The tables below show, for all climate zones:

1) The 10 scenarios with the lowest number of overheated hours compared with ASHRAE 55 simplified method based on a 2020s typical weather year, excluding extreme weather events,
   a. holding the envelope fixed at "mid"-level performance and window to wall ratio fixed at 40% for climate zones 4-6 (as these are the most likely to represent a "typical" design), and
   b. holding the envelope fixed at "high"-level performance and window to wall ratio fixed at 20% for climate zones 7a-8 (as these climate zones are likely to require additional ECMs to meet Steps)
2) The 10 lowest incremental capital cost scenarios meeting a 200-hour threshold (the current threshold in the City of Vancouver EMG) with ASHRAE 55 simplified method based on 2020s typical weather year, with envelope and window to wall criteria same as above.

Table 6-12. Passive cooling measures combined impacts – 10 lowest number of hours over simplified ASHRAE 55

CZ	Envelope	WWR	SHGC	Night Pre-cool	HRV Bypass	HRV Boost	Over-hang	Fin	Ext. Shade	Equivalent open area (%) if 40% WWR	Overheated Hours (Simplified ASHRAE 55 2020s)	Overheated Hours (Over 26C 2020s)	Overheated Hours (Simplified ASHRAE 55 2050s)	Overheated Hours (Over 26C 2050s)	Total ICC ($/m2)	% ICC	Meet 200 hours vs simplified ASHRAE 55 for 2020s weather	Meet 20 hours vs simplified ASHRAE 55 for 2020s weather
4	Mid	40	0.2	16	Yes	No	No	No	Yes	20	24	42	81	136	39	1.2	Yes	No
4	Mid	40	0.2	16	Yes	Yes	No	No	Yes	20	24	42	81	137	43	1.4	Yes	No
4	Mid	40	0.2	18	Yes	Yes	No	No	Yes	20	24	41	81	137	43	1.4	Yes	No
4	Mid	40	0.2	18	Yes	No	No	No	Yes	20	24	42	81	136	39	1.2	Yes	No
4	Mid	40	0.2	18	No	No	No	No	Yes	20	27	45	83	141	33	1.0	Yes	No
4	Mid	40	0.2	16	No	No	No	No	Yes	20	27	46	82	141	33	1.0	Yes	No
4	Mid	40	0.4	18	Yes	Yes	No	No	Yes	20	29	48	91	148	43	1.4	Yes	No
4	Mid	40	0.4	18	Yes	No	No	No	Yes	20	29	49	91	148	39	1.2	Yes	No
4	Mid	40	0.4	16	Yes	No	No	No	Yes	20	29	49	90	148	39	1.2	Yes	No
4	Mid	40	0.4	16	Yes	Yes	No	No	Yes	20	30	49	91	148	43	1.4	Yes	No
5	Mid	40	0.2	18	Yes	No	No	No	Yes	20	401	667	719	1056	37	1.1	No	No
5	Mid	40	0.2	16	Yes	No	No	No	Yes	20	402	668	718	1056	37	1.1	No	No
5	Mid	40	0.2	16	Yes	No	No	No	Yes	20	402	668	718	1056	37	1.1	No	No
5	Mid	40	0.2	16	Yes	Yes	No	No	Yes	20	403	665	721	1055	41	1.3	No	No
5	Mid	40	0.2	18	Yes	Yes	No	No	Yes	20	403	666	722	1054	41	1.3	No	No
5	Mid	40	0.2	16	No	No	No	No	Yes	20	413	690	728	1077	32	1.0	No	No
5	Mid	40	0.2	18	No	No	No	No	Yes	20	414	689	728	1077	32	1.0	No	No
5	Mid	40	0.4	18	Yes	Yes	No	No	Yes	20	457	707	765	1090	41	1.3	No	No
5	Mid	40	0.4	16	Yes	Yes	No	No	Yes	20	457	708	765	1089	41	1.3	No	No
5	Mid	40	0.4	16	Yes	No	No	No	Yes	20	457	710	762	1092	37	1.1	No	No
5	Mid	40	0.4	18	Yes	No	No	No	Yes	20	458	709	762	1091	37	1.1	No	No
6	Mid	40	0.2	18	Yes	Yes	No	No	Yes	20	107	94	218	191	50	1.6	Yes	No
6	Mid	40	0.2	16	Yes	Yes	No	No	Yes	20	107	95	218	191	50	1.6	Yes	No
6	Mid	40	0.2	16	Yes	No	No	No	Yes	20	109	96	221	193	44	1.4	Yes	No
6	Mid	40	0.2	18	Yes	No	No	No	Yes	20	110	97	221	193	44	1.4	Yes	No
6	Mid	40	0.2	16	Yes	Yes	Yes	No	No	20	117	109	232	211	347	10.8	Yes	No
6	Mid	40	0.2	18	Yes	Yes	Yes	No	No	20	119	109	233	211	347	10.8	Yes	No
6	Mid	40	0.2	18	No	No	No	No	Yes	20	120	107	238	205	38	1.2	Yes	No
6	Mid	40	0.2	16	No	No	No	No	Yes	20	121	107	237	206	38	1.2	Yes	No
6	Mid	40	0.2	16	Yes	No	Yes	No	No	20	121	112	237	213	341	10.7	Yes	No
6	Mid	40	0.2	18	Yes	No	Yes	No	No	20	121	112	237	213	341	10.7	Yes	No
7a	High	20	0.2	16	Yes	Yes	Yes	No	No	20	144	149	264	265	179	5.6	Yes	No
7a	High	20	0.2	18	Yes	Yes	Yes	No	No	20	145	149	264	265	179	5.6	Yes	No

CZ	Envelope	WWR	SHGC	Night Pre-cool	HRV Bypass	HRV Boost	Over-hang	Fin	Ext. Shade	Equivalent open area (%) if 40% WWR	Overheated Hours (Simplified ASHRAE 55 2020s)	Overheated Hours (Over 26C 2020s)	Overheated Hours (Simplified ASHRAE 55 2050s)	Overheated Hours (Over 26C 2050s)	Total ICC ($/m2)	% ICC	Meet 200 hours vs simplified ASHRAE 55 for 2020s weather	Meet 20 hours vs simplified ASHRAE 55 for 2020s weather
7a	High	20	0.2	16	Yes	No	Yes	No	No	20	147	150	267	268	173	5.4	Yes	No
7a	High	20	0.2	18	Yes	No	Yes	No	No	20	147	151	267	268	173	5.4	Yes	No
7a	High	20	0.2	18	Yes	Yes	No	No	Yes	20	149	151	259	268	31	1.0	Yes	No
7a	High	20	0.2	16	Yes	Yes	No	No	Yes	20	149	152	259	268	31	1.0	Yes	No
7a	High	20	0.2	16	Yes	No	No	No	Yes	20	152	152	260	269	25	0.8	Yes	No
7a	High	20	0.2	18	Yes	No	No	No	Yes	20	153	153	260	268	25	0.8	Yes	No
7a	High	20	0.2	18	No	No	No	No	Yes	20	162	159	271	276	19	0.6	Yes	No
7a	High	20	0.2	16	No	No	No	No	Yes	20	162	159	270	277	19	0.6	Yes	No
7a	High	20	0.2	18	No	No	Yes	No	No	20	164	163	282	280	168	5.2	Yes	No
7b	High	20	0.2	18	Yes	Yes	No	No	Yes	20	111	129	257	285	40	1.3	Yes	No
7b	High	20	0.2	16	Yes	Yes	No	No	Yes	20	111	129	256	285	40	1.3	Yes	No
7b	High	20	0.2	16	Yes	Yes	Yes	No	No	20	112	134	263	291	234	7.3	Yes	No
7b	High	20	0.2	18	Yes	Yes	Yes	No	No	20	112	134	263	291	234	7.3	Yes	No
7b	High	20	0.2	16	Yes	No	Yes	No	No	20	114	137	266	293	227	7.1	Yes	No
7b	High	20	0.2	18	Yes	No	Yes	No	No	20	114	136	266	294	227	7.1	Yes	No
7b	High	20	0.2	18	Yes	No	No	No	Yes	20	114	131	260	286	33	1.0	Yes	No
7b	High	20	0.2	16	Yes	No	No	No	Yes	20	115	132	261	286	33	1.0	Yes	No
7b	High	20	0.2	18	No	No	No	No	Yes	20	124	146	272	302	25	0.8	Yes	No
7b	High	20	0.2	16	No	No	No	No	Yes	20	125	146	272	301	25	0.8	Yes	No
7b	High	20	0.2	18	No	No	No	No	Yes	20	124	146	272	302	25	0.8	Yes	No
7b	High	20	0.2	16	No	No	No	No	Yes	20	125	146	272	301	25	0.8	Yes	No
8	High	20	0.2	18	Yes	Yes	No	No	Yes	20	63	66	N/A	N/A	40	1.3	Yes	No
8	High	20	0.2	18	Yes	No	No	No	Yes	20	64	66	N/A	N/A	33	1.0	Yes	No
8	High	20	0.2	16	Yes	No	No	No	Yes	20	64	66	N/A	N/A	33	1.0	Yes	No
8	High	20	0.2	16	Yes	Yes	No	No	Yes	20	64	66	N/A	N/A	40	1.3	Yes	No
8	High	20	0.2	18	No	No	No	No	Yes	20	67	69	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	16	No	No	No	No	Yes	20	67	69	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	16	Yes	No	Yes	No	No	20	67	69	N/A	N/A	227	7.1	Yes	No
8	High	20	0.2	18	Yes	Yes	Yes	No	No	20	67	67	N/A	N/A	234	7.3	Yes	No
8	High	20	0.2	16	Yes	Yes	Yes	No	No	20	67	67	N/A	N/A	234	7.3	Yes	No
8	High	20	0.2	18	Yes	No	Yes	No	No	20	67	69	N/A	N/A	227	7.1	Yes	No

Table 6-13. Passive cooling measures combined impacts – Lowest ICC Meeting 200 Hours with 2020s weather

CZ	Envelope	WWR	SHGC	Night Pre-cool	HRV Bypass	HRV Boost	Over-hang	Fin	Ext. Shade	Equivalent open area (%) if 40% WWR	Overheated Hours (Simplified ASHRAE 55 2020s)	Overheated Hours (Over 26C 2020s)	Overheated Hours (Simplified ASHRAE 55 2050s)	Overheated Hours (Over 26C 2050s)	Total ICC ($/m2)	% ICC	Meet 200 hours vs simplified ASHRAE 55	Meet 20 hours vs simplified ASHRAE 55?
4	Mid	40	0.2	18	No	No	No	No	Yes	20	27	45	83	141	33	1.0	Yes	No
4	Mid	40	0.2	16	No	No	No	No	Yes	20	27	46	82	141	33	1.0	Yes	No
4	Mid	40	0.4	18	No	No	No	No	Yes	20	30	50	93	154	33	1.0	Yes	No
4	Mid	40	0.4	16	No	No	No	No	Yes	20	30	50	93	154	33	1.0	Yes	No
4	Mid	40	0.2	18	No	No	No	No	Yes	5	73	154	258	408	33	1.0	Yes	No
4	Mid	40	0.2	16	No	No	No	No	Yes	5	73	155	259	408	33	1.0	Yes	No
4	Mid	40	0.4	18	No	No	No	No	Yes	5	107	203	301	459	33	1.0	Yes	No
4	Mid	40	0.4	16	No	No	No	No	Yes	5	108	202	302	460	33	1.0	Yes	No
4	Mid	40	0.2	16	Yes	No	No	No	Yes	20	24	42	81	136	39	1.2	Yes	No
4	Mid	40	0.2	18	Yes	No	No	No	Yes	20	24	42	81	136	39	1.2	Yes	No
5	No scenarios meet 200 hours criteria.																	
6	Mid	40	0.2	18	No	No	No	No	Yes	20	120	107	238	205	38	1.2	Yes	No
6	Mid	40	0.2	16	No	No	No	No	Yes	20	121	107	237	206	38	1.2	Yes	No
6	Mid	40	0.4	18	No	No	No	No	Yes	20	148	124	265	229	38	1.2	Yes	No
6	Mid	40	0.4	16	No	No	No	No	Yes	20	149	124	265	229	38	1.2	Yes	No
6	Mid	40	0.2	16	Yes	No	No	No	Yes	20	109	96	221	193	44	1.4	Yes	No
6	Mid	40	0.2	18	Yes	No	No	No	Yes	20	110	97	221	193	44	1.4	Yes	No
6	Mid	40	0.4	16	Yes	No	No	No	Yes	20	136	119	253	219	44	1.4	Yes	No
6	Mid	40	0.4	18	Yes	No	No	No	Yes	20	138	119	256	220	44	1.4	Yes	No
6	Mid	40	0.2	16	Yes	No	No	No	Yes	5	190	161	341	294	44	1.4	Yes	No
6	Mid	40	0.2	18	Yes	No	No	No	Yes	5	190	160	340	293	44	1.4	Yes	No
7a	High	20	0.2	18	No	No	No	No	Yes	20	162	159	271	276	19	0.6	Yes	No
7a	High	20	0.2	16	No	No	No	No	Yes	20	162	159	270	277	19	0.6	Yes	No
7a	High	20	0.4	18	No	No	No	No	Yes	20	174	169	294	290	19	0.6	Yes	No
7a	High	20	0.4	16	No	No	No	No	Yes	20	176	170	294	290	19	0.6	Yes	No
7a	High	20	0.2	16	Yes	No	No	No	Yes	20	152	152	260	269	25	0.8	Yes	No
7a	High	20	0.2	18	Yes	No	No	No	Yes	20	153	153	260	268	25	0.8	Yes	No
7a	High	20	0.4	16	Yes	No	No	No	Yes	20	169	163	282	281	25	0.8	Yes	No
7a	High	20	0.4	18	Yes	No	No	No	Yes	20	169	164	284	282	25	0.8	Yes	No
7a	High	20	0.2	18	Yes	Yes	No	No	Yes	20	149	151	259	268	31	1.0	Yes	No
7a	High	20	0.2	16	Yes	Yes	No	No	Yes	20	149	152	259	268	31	1.0	Yes	No
7b	High	20	0.2	18	No	No	No	No	Yes	20	124	146	272	302	25	0.8	Yes	No
7b	High	20	0.2	16	No	No	No	No	Yes	20	125	146	272	301	25	0.8	Yes	No
7b	High	20	0.4	18	No	No	No	No	Yes	20	143	169	294	324	25	0.8	Yes	No
7b	High	20	0.4	16	No	No	No	No	Yes	20	143	168	295	323	25	0.8	Yes	No
7b	High	20	0.2	18	Yes	No	No	No	Yes	20	114	131	260	286	33	1.0	Yes	No
7b	High	20	0.2	16	Yes	No	No	No	Yes	20	115	132	261	286	33	1.0	Yes	No
7b	High	20	0.4	16	Yes	No	No	No	Yes	20	136	154	284	312	33	1.0	Yes	No
7b	High	20	0.4	18	Yes	No	No	No	Yes	20	137	156	285	312	33	1.0	Yes	No

CZ	Envelope	WWR	SHGC	Night Pre-cool	HRV Bypass	HRV Boost	Over-hang	Fin	Ext. Shade	Equivalent open area (%) if 40% WWR	Overheated Hours (Simplified ASHRAE 55 2020s)	Overheated Hours (Over 26C 2020s)	Overheated Hours (Simplified ASHRAE 55 2050s)	Overheated Hours (Over 26C 2050s)	Total ICC ($/m2)	% ICC	Meet 200 hours vs simplified ASHRAE 55	Meet 20 hours vs simplified ASHRAE 55?
7b	High	20	0.2	18	Yes	Yes	No	No	Yes	20	111	129	257	285	40	1.3	Yes	No
7b	High	20	0.2	16	Yes	Yes	No	No	Yes	20	111	129	256	285	40	1.3	Yes	No
8	High	20	0.2	18	No	No	No	No	Yes	20	67	69	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	16	No	No	No	No	Yes	20	67	69	N/A	N/A	25	0.8	Yes	No
8	High	20	0.4	18	No	No	No	No	Yes	20	70	73	N/A	N/A	25	0.8	Yes	No
8	High	20	0.4	16	No	No	No	No	Yes	20	70	74	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	16	No	No	No	No	Yes	5	187	211	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	18	No	No	No	No	Yes	5	188	210	N/A	N/A	25	0.8	Yes	No
8	High	20	0.2	18	Yes	No	No	No	Yes	20	64	66	N/A	N/A	33	1.0	Yes	No
8	High	20	0.2	16	Yes	No	No	No	Yes	20	64	66	N/A	N/A	33	1.0	Yes	No
8	High	20	0.4	18	Yes	No	No	No	Yes	20	67	71	N/A	N/A	33	1.0	Yes	No
8	High	20	0.4	16	Yes	No	No	No	Yes	20	68	71	N/A	N/A	33	1.0	Yes	No

Table 6-14. Passive cooling measures combined impacts – Options meeting 20 Hours with 2020s weather

CZ	Envelope	WWR	SHGC	Night Pre-cool	HRV Bypass	HRV Boost	Over-hang	Fin	Ext. Shade	Equivalent open area (%) if 40% WWR	Overheated Hours (Simplified ASHRAE 55 2020s)	Overheated Hours (Over 26C 2020s)	Overheated Hours (Simplified ASHRAE 55 2050s)	Overheated Hours (Over 26C 2050s)	Total ICC ($/m2)	% ICC	Meet 200 hours vs simplified ASHRAE 55	Meet 20 hours vs simplified ASHRAE 55?
4	Low	20	0.2	18	Yes	No	Yes	No	No	20	20	39	79	148	151	4.7	Yes	Yes
4	Low	20	0.2	16	Yes	No	Yes	No	No	20	20	39	79	148	151	4.7	Yes	Yes
4	Mid	20	0.2	18	Yes	No	Yes	No	No	20	20	39	79	150	151	4.7	Yes	Yes
4	Mid	20	0.2	16	Yes	No	Yes	No	No	20	20	39	79	150	151	4.7	Yes	Yes
4	High	20	0.2	18	Yes	No	Yes	No	No	20	20	40	81	155	151	4.7	Yes	Yes
4	High	20	0.2	16	Yes	No	Yes	No	No	20	20	40	81	155	151	4.7	Yes	Yes
4	Low	20	0.2	18	Yes	Yes	Yes	No	No	20	20	38	79	148	156	4.9	Yes	Yes
4	Low	20	0.2	16	Yes	Yes	Yes	No	No	20	20	38	79	148	156	4.9	Yes	Yes
4	Mid	20	0.2	18	Yes	Yes	Yes	No	No	20	20	39	81	149	156	4.9	Yes	Yes
4	Mid	20	0.2	16	Yes	Yes	Yes	No	No	20	20	39	80	150	156	4.9	Yes	Yes
5	No scenarios meet 20 hours criteria																	
6	No scenarios meet 20 hours criteria																	
7a	No scenarios meet 20 hours criteria																	
7b	No scenarios meet 20 hours criteria																	
8	No scenarios meet 20 hours criteria																	

With the exception of climate zone 5, all other climate zones have a combination of modeled passive cooling options to meet a 200 hour maximum.

Very few of the options modeled (for any range of envelope or WWR inputs) would meet the 20 hour maximum for vulnerable populations, based on future-projected 2020s and 2050s weather. It may be possible to meet the 20-hour target based on CWEC 2016 weather files that are backward-looking and have cooler temperatures; in addition it may be possible to meet this target with project-specific design optimization. However, active cooling or additional design measures that fall beyond the range of the typical measures included in this study would likely be required for most buildings to meet 20 hours for vulnerable populations based on any future-projected weather.

Most projects in climate zone 5 are also unlikely to be able to use only passive cooling measures to achieve a 200 or fewer overheated hours target using future-projected weather files, though project-specific design optimization may certainly be possible leading to improved outcomes compared with a generalized archetype study.

Using the 2050s future projected weather, most climate zones are very close to or slightly over the 200 hour limit even applying the most aggressive combination of passive cooling measures included in the study. Climate zone 5 (using the Kamloops weather file) has more cooling degree days than other climate zones, and has substantial overheated hours using the 2020s weather file. With 2050s weather, the model shows approximately 700 overheated hours, and, if this represented 12 hours per day of overheating, would be approximately two months of overheating per typical weather year (not accounting for extreme weather events such as heat waves).

Climate zone 4 does maintain options to meet a 200-hour target even using future-projected 2050s typical weather year files, with the best case scenarios around 80 hours. Climate zone 6 scenarios approach very close to 200 hours (approx. 195 – 205 for the best cases). The lowest in climate zones 7a and 7b are approximately 250 hours. Future-projected weather files are not available for Yellowknife (climate zone 8).

It should be noted that the ASHRAE 55 acceptability limits have not been adjusted in this study to account for changing comfort criteria as occupants get acclimatized to higher temperatures; the 2020's based limits are applied throughout for a more readable comparison of indoor temperatures.

If mechanical cooling is not required currently, consideration could be given to employing resiliency measures allowing for straightforward future installation of mechanical cooling, such as sufficient electrical infrastructure and planned locations of future cooling systems.

6.1.5 Cost Impacts – Part 3

The cost impacts of the BC Energy Step Code Steps are evaluated using several metrics, and the average of the 10 best scenarios for each metric are summarized below. Each metric is evaluated individually, so for example the lowest incremental capital cost scenario may not have the same design characteristics as the most favorable scenarios for NPV. In reality,

project teams may optimize for any of these characteristics or a combination thereof, or based on other needs entirely, and the outcomes on a project by project basis are expected to vary.

A brief sensitivity analysis of discount rate and carbon tax is shown below.

The individual scenarios summarized in the table below are available as tables in Appendix C.

Lowest ICC

Table 6-15. Average cost impact of 10 lowest ICC Options

	Step	Lowest % ICC Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Hotel	1	0.0%	0.1%	0.3%	0.1%	0.2%	-4.4%
	2	0.5%	0.8%	2.0%	2.2%	4.9%	10.6%
	3	1.7%	2.8%	4.4%	4.5%	11.2%	11.4%
	4	N/A	7.3%	9.1%	9.1%	12.1%	N/A
High MURB	1	-0.4%	-0.4%	-0.3%	-0.1%	Not run	Not run
	2	0.0%	0.5%	1.6%	2.9%	Not run	Not run
	3	0.5%	0.9%	5.2%	10.2%	Not run	Not run
	4	3.1%	3.7%	11.8%	12.4%	Not run	Not run
Low MURB	1	-0.4%	-0.4%	-1.2%	-0.1%	-18.9%	0.2%
	2	-0.4%	0.4%	0.5%	0.3%	2.8%	2.1%
	3	0.4%	0.4%	2.8%	3.4%	4.9%	4.3%
	4	1.3%	2.3%	4.6%	5.4%	7.3%	6.8%
Office	1	-1.8%	-2.2%	-2.2%	-1.7%	Not run	Not run
	2	-2.3%	-2.2%	-2.0%	-0.3%	Not run	Not run
	3	-2.3%	-2.0%	-1.2%	0.7%	Not run	Not run
Retail	1	-9.0%	-10.0%	-12.1%	-7.4%	Not run	Not run
	2	-9.1%	-9.3%	-11.8%	-6.4%	Not run	Not run
	3	-8.9%	-9.0%	-10.4%	-5.4%	Not run	Not run

A negative % ICC indicates that there is a potential cost savings available, compared with the NECB 2015 baseline. In general, this is assessed because of differences in window to wall ratio and tradeoffs between window and wall performance. In cases where the window is higher cost than the wall, reducing window area would provide a cost savings, and vice-versa. This is particularly true in the retail archetype, where the proposed scenarios only test 5% to 20% window to wall ratio, a reduction in window area compared with the baseline. Similarly, where

the baseline requires HRVs, a proposed scenario that achieves targets without using HRVs may see a cost savings.

One other element of note is that the hotel in climate zone 4 does not show any options meeting Step 4. This is due to high TEUI in the simulated archetype hotel, which includes commercial kitchen, laundry, and pool loads for all cases. If process loads were reduced, the archetype would readily meet targets.

Near-zero infiltration options have been excluded from most runs, with the exception of some high Steps in cold climate zones. See Section 2.1.3 for discussion. The runs that include near-zero infiltration are: Step 4 hotel in CZ 4-6 and 7b, and Step 3 hotel in CZ8; Step 4 in CZ7a for high-rise MURB, and Step 4 for CZ7a and 7b for low-rise MURB. This applies to both ICC and NPV, below.

Highest NPV

Table 6-16. Average cost impact of 10 highest NPV Options

	Step	Highest NPV ($/m² over 20-year life) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Hotel	1	149	149	139	106	100	251
	2	146	144	121	81	8	-160
	3	114	107	72	26	-174	-164
	4	N/A	-17	-65	-122	-201.3	N/A
High MURB	1	69	75	107	43	Not run	Not run
	2	67	79	94	-34	Not run	Not run
	3	72	72	8	-264	Not run	Not run
	4	11	4	-185	-348	Not run	Not run
Low MURB	1	69	75	109	53	624	33
	2	71	78	108	54	0	-15
	3	75	77	70	-18	-52	-64
	4	56	41	26	-59	-99	-120
Office	1	172	185	196	170	Not run	Not run
	2	176	186	189	152	Not run	Not run
	3	175	180	181	134	Not run	Not run
Retail	1	230	248	290	177	Not run	Not run
	2	226	226	284	156	Not run	Not run
	3	214	223	251	130	Not run	Not run

Lowest Cost of GHG Abatement

Table 6-17. Average cost impact of 10 lowest cost of GHG Abatement options

	Step	Lowest Incremental Capital Cost of GHG Abatement ($/m² ICC/tCO2e saved) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Hotel	1	0	0.1	0.2	0.1	0.2	-4.2
	2	0.5	0.8	1.6	2.1	4.3	9.2
	3	1.8	2.7	3.6	4.2	9.7	9.7
	4	N/A	7.3	7.9	9	11.1	N/A
High MURB	1	-10.8	-10.2	-8	-1.9	Not run	Not run
	2	-0.8	1.6	5.3	15.6	Not run	Not run
	3	1.6	3.8	15.2	49.4	Not run	Not run
	4	10.9	15	54.7	-348.1	Not run	Not run
Low MURB	1	-12.5	-11.2	-22.7	-3.9	-222.0	1.3
	2	-7.0	1.2	0.9	2.5	15.5	11.0
	3	1.2	2.3	5.3	17.0	25.7	21.6
	4	5.4	6.7	22.6	52.9	55.6	41.7
Office	1	-7.9	-243.5	-4,636.1	-1,922.5	Not run	Not run
	2	-27.6	-79.5	-41.2	-16.0	Not run	Not run
	3	-21.7	-17.8	-7.0	-12.9	Not run	Not run
Retail	1	-49,226.0	-37,065.9	-182,217.0	-5,672,503.4	Not run	Not run
	2	-214,683.5	-96,537.8	-449,277.8	-59,333,086.1	Not run	Not run
	3	-3,419,301.4	-68,405.9	-71,063.8	-1,178,806.5	Not run	Not run

A negative cost of GHG abatement indicates that carbon abatement is actually a cost savings to the project. Larger numbers, such as the retail cost of GHG abatement, are based on scenarios which have a high incremental capital cost savings, but save a fairly small amount of GHG emissions. This leads to a large numerator and small denominator (less than 1 but above 0), and therefore a very large cost savings per tons CO2 saved. These $/tCO2e saved do not necessarily scale across measures that would save larger amounts of GHG emissions. Further discussion of measures that specifically target GHG savings, and the costs thereof, can be found in Section 6.1.3.

Unlike the 2018 Metrics Report, which used NPV $/GHG saved, the table above uses $ ICC / GHG saved. This methodology was used because the NPV was fairly widely varied in both the

previous report and this one, whereas the ICC metric was somewhat more consistent across Steps and locations, allowing greater clarity and simplicity in understanding patterns across the analysis.

NPV Sensitivity

A 3% discount rate is applied to results throughout the study, and the NPV considers a 20-year life. A 2% utility escalation rate is included, and an escalating carbon tax is also accounted for (with separate sensitivity analysis shown below.)

The following example uses the high-rise MURB in climate zone 4 to investigate sensitivity of NPV to discount rate. The same scenario, a Step 3 building with electric baseboards and electric resistance DHW, is used for all scenarios in Tables 6-18 and 6-19 below.

Table 6-18. Discount Rate Sensitivity Analysis

Discount Rate	Utility Cost Escalation Rate	Total ICC ($/m²)	Annual Energy Cost ($/m²/yr average over 20 years in today's dollars)	20-year NPV ($/m²)
2%	2%	20.9	9.6	63.7
3%	2%	20.9	8.8	56.0
4%	2%	20.9	8.1	49.2
5%	2%	20.9	7.4	43.4
6%	2%	20.9	6.9	38.2
7%	2%	20.9	6.4	33.6
8%	2%	20.9	5.9	29.6
9%	2%	20.9	5.5	26.0
10%	2%	20.9	5.2	22.9

Table 6-19. Utility Cost Escalation Rate Sensitivity Analysis

Discount Rate	Utility Cost Escalation Rate	Total ICC ($/m²)	Annual Energy Cost ($/m²/yr average over 20 years in today's dollars)	20-year NPV ($/m²)
3%	1%	20.9	8.0	50.8
3%	2%	20.9	8.8	56.0
3%	3%	20.9	9.6	61.8
3%	4%	20.9	10.6	68.3
3%	5%	20.9	11.6	75.7
3%	6%	20.9	12.8	84.0
3%	7%	20.9	14.2	93.3
3%	8%	20.9	15.7	103.8
3%	9%	20.9	17.4	115.6
3%	10%	20.9	19.3	129.0

A higher discount rate leads to lower NPVs, as future utility cost savings are evaluated as lower worth than with a lower discount rate.

The utility escalation rate also impacts NPV, as greater utility cost savings compared with a base case building lead to improved paybacks.

A brief combined analysis of utility cost escalation and discount rate is shown below. In the base case results of the report, the utility cost escalation rate is 1% below the discount rate (escalation = 2% and discount = 3%). This relationship as well as other potential relationships between the two is tested.

Table 6-20. Utility Cost Escalation Rate and Discount Rate Sensitivity Analysis

Discount Rate	Utility Cost Escalation Rate	Total ICC ($/m²)	Annual Energy Cost ($/m²/yr average over 20 years in today's dollars)	20-year NPV ($/m²)
3%	2%	20.9	8.8	56.0
5%	4%	20.9	8.8	53.0
5%	5%	20.9	9.6	58.7
6%	5%	20.9	8.8	51.8
8%	7%	20.9	8.8	49.9
8%	8%	20.9	9.6	55.5
9%	8%	20.9	8.8	49.1

Carbon Tax Sensitivity

To conduct a brief sensitivity analysis for carbon pricing, the most significant impacts will be seen in GHG reduction measures. The table below summarizes the costs between condensing boiler and ASHP for a high-rise MURB in climate zone 7a. Other design measures are held constant (mid density, VFAR 0.6, wall R-10, roof R-40, code infiltration, window-to-wall ratio 40%, 20% domestic hot water savings).

In all cases, the utility cost for the air-source heat pump building on an annual basis is lower than that of the boiler, though the 20-year NPV of the ASHP is still lower than that of the lower capital cost boiler scenario.

Table 6-21. Sensitivity Analysis for Carbon Pricing for a MURB in CZ7a

Heating System	Carbon Cost Scenario	Annual Utility Cost ($/m²)	GHG Abatement ($/m²)	ICC ($/m²)	NPV
Condensing Boiler	Escalate to 300	13.9	48.1	55.4	-38.3
Condensing Boiler	Stop at 170	13.5	48.1	55.4	-38.8
Condensing Boiler	Stop at 50	12.3	48.1	55.4	-40.2
ASHP	Escalate to 300	12.5	10.1	104.2	-58.3
ASHP	Stop at 170	12.3	10.1	104.2	-63.1
ASHP	Stop at 50	11.7	10.1	104.2	-76.2

6.2 Part 9

6.2.1 Comparison with 2018 Metrics Report

Step Code metrics have changed since the 2018 Metrics Report (e.g. the use of Adjusted TEDI and % better than envelope), and the present report includes some additions and changes to the models (e.g. the inclusion of the laneway dwelling). However, a brief comparison of the lowest-cost ECMs and results for one of the archetypes that was modeled in both reports may provide some context for similarities and differences.

Looking at the medium single family dwelling in climate zones 4 and 7a, the following significant ECMs and ICC comparison can be made. The 2018 Metrics Report scenario is from the lowest ICC table in Section 8.8; the current report scenario is selected to represent a similar set of inputs from the set of lowest ICC results.

Table 6-22. Comparison of Medium Single Family ECMs and results in 2018 and current reports

	Climate Zone 4 (Vancouver)		Climate Zone 7a (Fort St. John)	
	2018 Metrics Report	Current Report	2018 Metrics Report	Current Report
Step 3				
Step 3 Energy Conservation Measures	ACH@50Pa 2.5 Wall R-16 Foundation Wall R-11 Underslab R-11 Ceiling/Roof R-50 Window USI-1.6 DHW: Electric Storage Heating System: Baseboard HRV 60% Drainwater heat recovery: none	ACH@50Pa 2.5 Wall R-22 Foundation Wall R-17 Underslab R-11 Ceiling/Roof R-60 Window USI-1.8 DHW: Tankless gas Heating System: gas furnace HRV: none Drainwater heat recovery: 30%	ACH@50Pa 1.5 Wall R-16 Foundation Wall R-17 Underslab R-0 Ceiling/Roof R-40 Window USI-1.2 DHW: Baseline Heating System: Baseboard HRV: 60%	ACH@50Pa 1.5 Wall R-22 Foundation Wall R-17 Underslab R-11 Ceiling/Roof R-50 Window USI-1.4, SHGC 0.35 DHW: Baseline Heating System: gas furnace HRV: None
Step 3 Energy Results (all in kWh/m²/year)	MEUI 44 TEDI 26	MEUI 49.9 TEDI 32.4	MEUI 87 TEDI 59	MEUI 100.9 TEDI 64.7
Step 3 Incremental Capital Cost	0.9%	1.1%	0.8%	1.2%
Step 5				
Step 5 Energy Conservation Measures	ACH@50Pa 0.6 Wall R-24 Foundation Wall R-20 Underslab R-11 Ceiling/Roof R-40 Window USI-1.2 DHW: Heat Pump Heating System: Baseboard HRV 70% Drainwater heat recovery: none	ACH@50Pa 1.o Wall R-30 Foundation Wall R-17 Underslab R-10 Ceiling/Roof R-60 Window USI-1.4 DHW: Tankless gas Heating System: ASHP HRV: 60% Drainwater heat recovery: none	ACH@50Pa 0.6 Wall R-40 Foundation Wall R-17 Underslab R-0 Ceiling/Roof R-70 Window USI-1.2 DHW: Instant Gas Heating System: Baseboard HRV: 70%	ACH@50Pa 0.6 Wall R-30 Foundation Wall R-17 Underslab R-14 Ceiling/Roof R-60 Window USI-1.4 DHW gas Heating System: CCASHP HRV 75%
Step 5 Energy Results (all in kWh/m²/year)	MEUI 23 TEDI 14	MEUI 25.6 TEDI 17	MEUI 54 TEDI 31	MEUI 59 TEDI 45.9
Step 5 Incremental Capital Cost	3.6%	2.9%	3.4%	3.1%

The Step 3 results in climate zone 4 in the current report show higher insulation values , and generally include either reduced air leakage to 1.5 ACH or drainwater heat recovery (a drainwater heat recovery scenario is shown in the table above), whereas the 2018 report shows somewhat lower envelope efficiency but includes an HRV as its lowest cost scenario. The incremental capital costs are very similar, with a slight increase in the current report.

Similarly, the lowest cost Step 3 results in climate zone 7a in the current report have improved envelope compared with the 2018 report but no HRV. The incremental capital cost percentages are the same between the 2018 results and current results. The MEUI and TEDI are higher in the current report, while still meeting Step 3. The TEDI can be higher while still meeting the Step 3 target TEDI due to the adjusted TEDI process, and the MEUI can be higher since the current report ECM package includes a CCASHP which means the calculated MEUI was compared to the MEUI target for houses with cooling.

Step 5 scenarios in the current results have slightly lower incremental costs compared with the 2018 report, and have more variation between solutions. One observation is that the solutions considered in the 2018 report used electric baseboards, while the lowest incremental capital cost solutions used for Step 5 in the current results set more typically use heat pumps; this may allow added flexibility in other measures such as envelope that result in lower overall ICC while still meeting targets.

Overall, within the locations and Steps examined above, similar ICCs are maintained from the 2018 Metrics Report to the current results set.

6.2.2 Impact of Shape and Window Area Variations

The medium and large single family dwellings were run with varied window to wall ratios (WWRs) and with varied building surface area to floor area ratio (SAR). The base case medium and large SFDs have window to wall ratios of 13%, increased by increments of 5% to 18% and 23%. The SAR for both medium and large SFDs is increased by 25% and by 50% from the initial base case model.

Additional window area drives a requirement for additional energy conservation measures to maintain energy performance. However, at lower steps and in warmer climate zones the incremental capital cost difference is minimal, at less than 0.3% additional cost. In colder climate zones at higher steps, there is a minor impact going from 13% to 18% window to wall ratio, then a more significant impact increasing further to 23%. This non-linear relationship where the energy impacts are minor within a range of window to wall ratios, then increase significantly above a certain threshold, aligns with the

> Many of the factors impacting SAR are design choices, however some may be required by some jurisdictions, such as a certain amount of articulation. Jurisdictions adopting the BC Energy Step Code should examine their other policies for alignment with these goals.

authors' anecdotal experience on previous projects. A design choice to increase window area substantially may increase costs for a particular project, requiring additional energy conservation measures to maintain energy performance.

Table 6-23. Impact of Window to Wall Ratio on Incremental Capital Cost

	Climate Zone 4 (Vancouver)			Climate Zone 7a (Fort St. John)		
	13% WWR	18% WWR	23% WWR	13% WWR	18% WWR	23% WWR
Step 3 ICC*	1.2%	1.2%	1.4%	1.3%	1.3%	1.4%
Step 5 ICC*	2.9%	3.0%	3.2%	3.1%	3.3%	4.7%

*Average of approximately 10 lowest ICC results.

The building surface area to floor area ratio, or SAR, is a means of quantifying the shape of the building, looking at the amount of exterior surface area (e.g. walls, roofs) compared with the amount of floor area. Higher SAR indicates more exterior surface area, therefore more heat loss via the exterior surfaces. Higher SAR may be indicative of shape complexity or articulation, a narrower floor plate, or higher floor-to-floor heights. It is anticipated that if SAR increases, additional energy conservation measures would be required to maintain energy performance. As the SAR increases, the window to wall ratio is maintained at the same percentage, thereby adding more absolute window area in proportion with the additional wall area. The SAR was increased in the model by adding length to the walls, while retaining the house floor area and volume as per the original model.

Table 6-24. Impact of Surface Area Ratio on Incremental Capital Cost

	Climate Zone 4 (Vancouver)			Climate Zone 7a (Fort St. John)		
	Base Case SAR	25% Increase	50% Increase	Base Case SAR	25% Increase	50% Increase
Step 3 ICC*	1.2%	2.0%	2.5%	1.3%	2.2%	2.5%
Step 5 ICC*	2.9%	3.9%	5.0%	3.1%	5.3%	6.5%

*Average of approximately 10 lowest ICC results.

The increase in energy conservation measures and associated costs to maintain performance if SAR increases are significant, and appear relatively consistent across the range of SARs tested. Many of the factors impacting SAR, noted above, are design choices, however some may be required by some jurisdictions (e.g. a certain amount of articulation), or may be dictated by site constraints (e.g. a narrower floor plate). Jurisdictions adopting the BC Energy Step Code should examine their other policies for alignment with these goals.

6.2.3 Impact of Laneway Home

The new laneway or smaller single family home model was created for this report and was not included in the previous 2018 Metrics Report. The laneway home is 750 ft^2, compared with 1100 ft^2 for the small single family dwelling, and is 2 storeys slab on grade.

Comparing with the medium single family dwelling to provide context, we can consider Step 3 and Step 5 runs in climate zones 4 and 7a, and consider the ECMs needed as well as the incremental capital costs. The table directly below compares sets of ECMs that are among the lowest ICC options for each dwelling type within the relevant Step.

Table 6-25. Laneway House and Medium SFD Measure Comparison – Low ICC Options

	Climate Zone 4 (Vancouver)		Climate Zone 7a (Fort St. John)	
	Laneway Home	Medium Single Family Dwelling	Laneway Home	Medium Single Family Dwelling
Step 3				
ACH	2.5	2.5	2.5	2.5
Roof/Ceiling	R-50	R-60	R-50	R-50
Windows	USI-1.4, SHGC 0.35	USI 1.8, SHGC 0.25	USI-1.4, SHGC 0.35	USI-1.4, SHGC 0.35
Wall	R-22	R-22	R-30	R-22
Slab on Grade / Foundation Walls	Uninsulated	R-17 Foundation Walls	Uninsulated	R-17 Foundation Walls
Heating	Electric Baseboard	Gas Furnace	Electric Baseboard	Gas Furnace
HRV	None	None	None	None
DHW	Tankless Gas	Tankless Gas, 30% Drainwater Heat Recovery	Tankless Gas	Tankless Gas
ICC ($)	4,154	5,942	8,344	9,627
ICC (%)	2.1%	1.1%	2.8%	1.2%
TEDI	25.5	32.4	87.1	74.1
MEUI	81.7	49.9	146.6	98.1
GHGI	11.4	9.2	12.7	17.9
% better than ERS	9.8%	10.8%	21%	20.4%
% better than Envelope	5.9%	-11%	19%	7.4%
Step 5				
ACH	1	1	1	1
Roof/Ceiling	R-50	R-50	R-50	R-60
Windows	USI-1.4, SHGC 0.35	USI-1.4, SHGC 0.35	USI-1.0, SHGC 0.35	USI-1.4, SHGC 0.35
Wall	R-40	R-30	R-40	R-40
Slab on Grade	R-14	R-10	R-10	R-10
Heating	Electric Baseboard	ASHP	CCASHP	CCASHP
HRV	85%	60%	75%	75%
DHW	HP	Tankless Gas	Tankless Gas	Gas
ICC ($) with CZ multiplier	10,520	14,903	23,762	23,672
ICC (%)	5.3%	2.9%	8.0%	3.0%
TEDI	17.8	17.4	51	45.1
MEUI	54.3	25.7	102.4	58.8
GHGI	1.7	3.4	13.2	6.4
% better than ERS	21.9%	37.7%	36.7%	45.9%
% better than Envelope	33.8%	40.2%	52.4%	43.7%

In all cases, the MEUI of the smaller laneway house is significantly higher. This is as expected; a smaller home will have many of the same loads (e.g. showering, dishwashing) spread out over less area. Energy modelling protocols for Step Code compliance follow EnerGuide Rating System standards, which assume the same occupants, hot water consumption and lighting/appliance/plug loads regardless of the size of the house. This is accounted for within the BC Energy Step Code by adjusting the targets to account for this.

The % ICC at Step 3 is relatively close between the laneway home and medium single family home, with approximately a 1% increase for the laneway home. The absolute value of the incremental capital cost is lower at Step 3 for the laneway home, however the laneway home's base construction cost is estimated lower than the medium single family dwelling, such that the denominator of the percentage calculation is impacted, and the ECMs become a larger proportion of the estimated total build cost.

At Step 5 in a warmer climate, a similar result holds true, with lower absolute incremental capital cost for the laneway home, but with a greater differential of % ICC and a relatively high ICC percentage, which may be of concern. For Step 5 in a colder climate, the absolute incremental cost value of ECMS in the laneway home is nearly equal to that of the medium single family home (within 1%), and continues to have a high % ICC.

The above results show a comparison among the lowest ICC options. However, they do not make it clear whether, or to what extent, the laneway homes require increased levels of ECMs, or whether the impacts on costs are primarily related to the lower total base case cost of the laneway homes due to their smaller size (for example, countertops or appliances also cost "more" in a small home – as in, they cost a larger percentage of the total budget, since the total cost is smaller).

To evaluate the necessity of more stringent ECMs, an additional set of scenarios is considered in Table 6-21, where the medium single family ECMs noted in the table above are applied to the laneway home, and the resulting Step level for the laneway home is checked. If the same set of options meets the same Step in the laneway home, that would tend to indicate that similar ECMs would meet similar Steps, whereas if additional ECMs are required, it may be indicative of inequity towards smaller homes.

The laneway home uses electric baseboard as the "base case" heating system, whereas the medium single family home uses gas furnace.

Table 6-26. Laneway House and Medium SFD Measure Comparison – Same ECMs

	Climate Zone 4 (Vancouver)		Climate Zone 7a (Fort St. John)	
	Laneway Home	Medium Single Family Dwelling	Laneway Home	Medium Single Family Dwelling
Step 3 for Medium Single Family Dwelling				
ACH	2.5	2.5	2.5	2.5
Roof/Ceiling	R-60	R-60	R-50	R-50
Windows	USI 1.8, SHGC 0.25	USI 1.8, SHGC 0.25	USI-1.0, SHGC 0.35	USI-1.4, SHGC 0.35
Wall	R-22	R-22	R-22	R-22
Slab on Grade / Foundation Walls	Uninsulated	Uninsulated	None	R-17 Foundation Walls
Heating	Electric Baseboard	Gas Furnace	Electric Baseboard	Gas Furnace
HRV	None	None	None	None
DHW	Tankless Gas, 30% Drainwater Heat Recovery	Tankless Gas, 30% Drainwater Heat Recovery	Tankless Gas	Tankless Gas
Step Level Achieved	3	3	1	3
ICC ($)	3,451	5,942	7,788	9,628
ICC (%)	1.7%	1.1%	4.0%	1.2%
TEDI	33.5	32.4	84.2	74.1
MEUI	84.6	49.9	149.6	98.1
% better than ERS	8.5%	13.5%	20%	20.4%
% better than Envelope	Not extracted	10.8%	22%	7.4%
Step 5				
ACH	1	1	1	1
Roof/Ceiling	R-50	R-50	R-60	R-60
Windows	USI-1.4, SHGC 0.35	USI-1.4, SHGC 0.35	USI-1.0, SHGC 0.35	USI-1.4, SHGC 0.35
Wall	R-30	R-30	R-40	R-40
Slab on Grade	R-10	R-10	R-10	R-10
Heating	ASHP	ASHP	Gas Furnace	CCASHP
HRV	60%	60%	75%	75%
DHW	Tankless Gas	Tankless Gas	Gas	Gas
Step Level	4	5	4	5
ICC ($)	11,389	14,903	18,275	24,003
ICC (%)	5.7%	2.9%	6.1%	3.0%
TEDI	17.7	17.4	51.6	45.1
MEUI	71.5	25.7	60.9	58.8
% better than ERS	19.2%	37.7%	52.1%	45.9%
% better than Envelope	35.3%	40.2%	53.2%	43.7%

The table above demonstrates that overall, the laneway home does require additional energy conservation measures compared with the medium single family dwelling to achieve the same Step levels.

6.2.4 Impact of Part 9 GHG/GHGI Targets

Similar to the data sheets developed for Part 3, a separate detailed GHG analysis was developed for Part 9 using the modelling developed for this report. The full detailed analysis is included as Appendix D.

Key highlights of the analysis are reproduced here.

Three levels of GHG Target are set, with the intent of driving decarbonization design measures at each level.

- Medium: The larger of either heating or DHW must use a low-carbon fuel.
- Low: Allows for smaller end uses such as cooking or gas dryers to use high-carbon fuel, or allows use of a small portion of high carbon fuel for large end uses (e.g. backup heating) but requires low-carbon fuel for most end-uses.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

The targets proposed within this report are preliminary for consideration and analysis.

Building Size

Building size is accounted for by setting an absolute base allowance and a maximum cap per unit for all buildings, then scaling the GHG targets linearly by size of dwelling between the base allowance and maximum cap for each level. The unit base allowance was set for 175 m^2 dwelling unit, the maximum cap based on a 400 m^2 dwelling unit.

The targets would be scaled by number of dwelling units in the building; e.g. a 4-plex would have four times the base per-unit allowance.

The reasoning for this approach is that:

- The base allowance per unit allows for fixed loads, such as domestic hot water or plug loads, that do not depend on the size of the dwelling. This assists modelling, design and construction of small, affordable housing units, while having minimal GHG impacts.
- The maximum cap per unit reflects that it is easier to achieve GHGI reductions in larger buildings.
- The GHGI variation between the minimum and maximum targets is used to drive efficient low-carbon building and mechanical design.

Targets are set using current Step 3 MEUI and TEDI targets, as well as an additional allowance for plug loads, lighting, and other base electric loads. This means each GHGI target is designed to be realistic for a Step 3 home to achieve when it decarbonizes one or more systems such as domestic hot water or heating. This also means that each GHGI target should, in theory, be even easier to achieve if a home meets Steps 4 or 5.

Climate Zones

The same targets are used for all climate zones; this reduces complexity and appears to be achievable based on the analysis conducted. The use of fuel switching causes significant reductions regardless of loads. Break points remain between target levels that generally encourage decarbonization at the appropriate levels. However, this can make more stringent targets in colder climate zones more challenging and introduce cost differentials.

Modelling Guidelines

Modelling guidelines may be required to ensure alignment between projects, including:

- GHG emission factors.
- Modelling auxiliary loads such as cooking loads, fireplaces, dryers, etc. using the appropriate fuels.
- Modelling backup heating appropriately.

Prescriptive Option

In addition, the potential for a prescriptive compliance path option is considered. Prescriptive target requirements are aligned with the intent of how the modeled targets were set.

The draft Medium target proposes to require heating to be decarbonized regardless of whether heating or domestic hot water would be more impactful for a particular building. Heating would be more impactful for buildings with higher absolute GHG use, in particular larger homes as well as those in colder climates. Therefore, for the backstop prescriptive target, the larger total impact measure across all dwellings is proposed as the requirement.

Table 6-27. Preliminary Proposed Part 9 Targets

	All Buildings: GHG Base Allowance per unit	OR	The smaller of GHG intensity or the maximum absolute cap, for the unit size.		OR	Prescriptive option (under consideration)
			Building GHG Intensity	GHG Maximum Cap per unit		
	kg CO2e per unit		kgCO2e/m2/year	kg CO2e per unit		
Medium	1050		6	2400		Decarbonize heating.
Low	440		2.5	800		Only backup heating or auxiliary uses (cooking, fireplaces, etc.) are allowed to use high carbon fuel.
Zero Carbon Ready	265		1.5	500		Project is fully decarbonized.

Renewable Natural Gas Analysis

Using renewable natural gas (RG or RNG) can lower the carbon emissions of a building compared to conventional natural gas.

The archetype examples focus primarily on electrification decarbonization measures because the energy and cost implications for these measures are more complex and require significant analysis to understand.

Renewable natural gas (RNG) decarbonization measures are much simpler from an analysis perspective:

- Use of RNG does not require changes to natural gas baseline equipment and therefore do not incur incremental capital costs.
- Utility cost of RNG in our analysis ends up cost neutral with natural gas once escalating carbon taxes over a 20-year period are accounted for (see assumptions above for more detail.)
- Thus, RNG becomes a simple 1:1 substitution for the modeled base case, which is typically natural gas.
- Therefore, what blend of RNG, as a percentage of total natural gas, would be sufficient to meet GHG targets?

The percentage of RNG required to meet targets is shown as a range because it will depend on the size of the dwelling (50 m^2 to 225 m^2 is shown below), with smaller homes requiring less RNG to meet targets. The percentage required will also vary with project specifics and design, for example a design that reduces natural gas heating loads would require a lower percentage of RNG. the below should be considered as a non-exhaustive example only. The below uses Step 3 as a base case

Table 6-28. RNG as a Percentage of Total Natural Gas Required to Meet Targets

Climate Zone	% RNG to meet Medium GHG Target	% RNG to meet Low GHG Target	% RNG to meet Zero Carbon Ready GHG Target
4	15% - 50%	70% - 80%	85% - 90%
5	20% - 80%	60% - 90%	70% - 90%
6	30% - 80%	65% - 90%	75% - 95%
7a	35% - 70%	75% - 90%	90% - 95%
7b	45% - 75%	80% - 90%	90% - 95%
8	50% - 80%	80% - 90%	90% - 95%

Archetype Analysis

The tables included in the detailed analysis (Appendix D) contain examples of modeled greenhouse gas emissions for a particular archetype, location, and set of design measures.

The "base case" within the table uses a high-carbon fuel and varied initial Step level design measures (envelope, heat recovery) to set an initial baseline prior to decarbonization. Decarbonization measures are then applied to heating and domestic hot water, separately and in combination. This is not an exhaustive list of options to meet targets but is meant to demonstrate a few example points, with key metrics including incremental capital cost, utility cost, and the GHG target level achieved. It should be noted that drainwater heat recovery has been excluded from all options for consistency and comparability of results between different Steps but could certainly be applied on projects to reduce domestic hot water load and associated GHGs. In some cases, slightly different measures are provided at different Step levels due to available modelling runs from the Metrics Research Report modelling done.

Levels achieved are determined based on the allowance, GHGI, and maximum cap.

Targets Achieved

- Each archetype in each climate zone shows at least one fully decarbonized, Zero Carbon Ready option.
- Each archetype shows at least one mid-range option, which will typically comply with the Medium target.
- Not all decarbonization measures have the same impact for each archetype and climate zone. Decarbonizing only the smaller of the two typically high-carbon end uses may not be sufficient. In many cases the higher impact of space heating or hot water will need to be decarbonized to meet targets.

- Most archetypes below achieve either no target, Medium, or Zero Carbon Ready. Only a few achieve the Low target. This is because the Low target is set to still require major systems to be decarbonized, but to allow some buffer for smaller end uses such as cooking, gas dryers, or some amount of backup heating. The archetypes modeled use electricity for these end uses by default and use cold climate heat pumps in climate zones 6 and above.

Carbon reduction impacts

A few examples of the amount of carbon reduction are below:

- Laneway home in Vancouver: **89% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Large single family dwelling in Summerland: **95% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Quadplex in Fort St. John: **93% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Medium single family dwelling in Cranbrook: **70% reduction** from Step 3 base case to Step 3 Middle target.
- 10-unit MURB in Fort Nelson: **76% reduction** from Step 3 base case to Step 3 Middle target.

Cost Impacts

- Maximum incremental capital cost for any of the below examples in all climate zones, including zero-carbon ready targets, is 3.4%. Typical incremental capital cost for most archetypes is lower, generally below 1.5%.
- Utility costs typically range from approximately 25% savings to 30% increase in costs related to decarbonization, accounting for increases in carbon taxes over time. There is not a linear relationship between decarbonization and utility costs; with efficiency improvements as well as increasing carbon taxes there are a range of utility cost outcomes shown.
- Utility cost impacts tend to show:
    - Greatest increase when employing electric resistance space heating (which is less efficient than a heat pump)
    - Greatest decrease when using heat pumps for both space heating and hot water

Electric Resistance Heating

In general, heat pumps are used as a decarbonization measure for both heating and domestic hot water. There are a few examples that demonstrate the difference between electric resistance systems (such as electric baseboard) and heat pump for space heating. While electric resistance is less efficient, it can be applied as a decarbonization measure. Electric resistance would typically have lower incremental cost and higher energy cost, and similar but slightly poorer GHG outcomes. The difference in GHG outcomes is likely to be

negligible to most projects and electric resistance could be applied; in particular cases where a design is right at the edge of a target it may not be useable. The same principles apply to using electric resistance for DHW.

Low Target and Backup Heating

The "low" target is intended to allow for some backup or auxiliary high-carbon fuel use but for all major systems to be decarbonized. The modelling done for the Metrics Research Report Update used the low-carbon default fuels for auxiliary uses such as cooking, dryers, etc. Heat pumps modeled for the archetype buildings are cold climate air source heat pumps in climate zones 6 and above, and use electric resistance backup/supplemental heating where required.

The amount of backup high-carbon fuel allowed for (with the rest of the building fully decarbonized) is equivalent to approximately:

- For a large single family dwelling in Fort St. John (climate zone 7a)
    - 12% of Step 3 total annual heating load
    - 15% of Step 5 total annual heating load
- For a quadplex in Fort St. John (climate zone 7a)
    - 30% of a Step 4 total annual heating load
- For a large single family dwelling in Uranium City (climate zone 8)
    - Only allows for 3% of Step 3 total annual heating load.

These projects would likely use the prescriptive option to meet targets. Compliance is also possible if the project fully decarbonizes and does not use high-carbon backup fuel

Detailed Modelling Analysis

The full detailed modelling analysis is reproduced as Appendix D to this report. A single example table is shown below to illustrate the available data.

Medium Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		●		None modeled	
Electric baseboard														
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	2372	1884	822		156	1958	1463	816		150	1611	807		141
Annual modelled GHGI	10	8	3.5		0.7	8.3	6.2	3.4		0.6	6.8	3.4		0.6
Annual modelled utility cost ($/m²)	4.6	5	5.1		5.1	4.5	4.9	4.9		4.9	4.4	4.7		4.7
Annual modelled utility cost increase vs. base case (%)	0	8.7%	10.9%		10.9%	0	8.9%	8.9%		8.9%	0%	6.8%		6.8%
Total ICC vs. base case ($/m²)	0	3.5	14.3		17.8	0	3.5	14		17.8	0	14.4		18.0
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0.2%	0.6%		0.8%	0%	0.6%		0.7%

6.2.5 Cost Impacts – Part 9

The table below shows the average incremental capital cost impacts of meeting all Steps in all climate zones for the simulated archetypes for Part 9 buildings.

Lowest ICC

Table 6-29. Average cost impact of 10 lowest ICC Options

	Step	Lowest % ICC Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Laneway	3	2.1%	2.3%	2.8%	2.8%	2.9%	2.6%
	4	2.7%	3.1%	4.5%	4.6%	6.0%	4.4%
	5	5.4%	6.4%	8.0%	8.0%	10.2%	8.5%
Small SFD	3	2.0%	2.2%	2.3%	2.1%	2.5%	2.5%
	4	3.1%	3.5%	4.3%	4.2%	5.4%	5.2%
	5	6.6%	7.5%	8.2%	8.3%	-	-
Medium SFD	3	1.2%	1.1%	1.3%	1.3%	1.3%	1.3%
	4	1.5%	1.5%	1.9%	2.0%	2.5%	2.5%
	5	2.9%	3.2%	3.3%	3.1%	3.5%	4.2%
Medium SFD – 18% WWR	3	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%
	4	1.6%	1.6%	2.0%	2.2%	2.8%	2.9%
	5	3.0%	3.3%	3.5%	3.3%	4.4%	4.8%
Medium SFD – 23% WWR	3	1.4%	1.4%	1.5%	1.4%	1.4%	1.5%
	4	1.8%	1.8%	2.2%	2.3%	3.1%	3.2%
	5	3.1%	3.9%	4.8%	4.7%	5.2%	5.6%
Medium SFD – 25 SAR	3	2.0%	1.8%	2.3%	2.2%	2.6%	2.6%
	4	2.3%	2.3%	2.6%	2.5%	3.3%	3.5%
	5	4.0%	5.2%	5.4%	5.3%	-	-
Medium SFD – 50 SAR	3	2.5%	2.7%	2.6%	2.5%	3.2%	3.2%
	4	2.7%	3.3%	3.3%	3.2%	4.1%	4.5%
	5	5.0%	6.8%	6.7%	6.5%	-	-
Large SFD	3	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%
	4	1.4%	1.4%	1.7%	1.7%	2.1%	2.0%
	5	3.3%	3.6%	3.8%	3.4%	3.6%	4.1%
	3	1.1%	1.1%	1.1%	1.2%	1.2%	1.3%

	Step	Lowest % ICC Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Large SFD – 18% WWR	4	1.6%	1.6%	2.0%	1.8%	2.4%	2.4%
	5	3.7%	4.0%	5.2%	3.9%	5.0%	0.0%
Large SFD – 23% WWR	3	1.2%	1.3%	1.5%	1.5%	1.7%	1.9%
	4	2.1%	2.2%	2.6%	2.3%	4.1%	4.1%
	5	1.7%	1.8%	2.0%	1.8%	3.1%	2.8%
Large SFD – 25 SAR	3	1.8%	2.2%	2.9%	2.5%	4.6%	3.4%
	4	5.3%	-	-	-	-	-
	5	1.9%	2.0%	2.1%	2.1%	2.5%	2.6%
Large SFD – 50 SAR	3	2.1%	2.5%	2.6%	2.5%	3.5%	3.8%
	4	5.8%	-	-	-	-	-
	5	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%
Quadplex	3	1.6%	1.5%	1.8%	2.1%	2.2%	2.4%
	4	2.2%	2.4%	2.7%	3.0%	3.4%	3.5%
	5	4.3%	4.5%	-	4.6%	-	-
Row	3	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%
	4	0.7%	0.7%	0.7%	0.8%	1.0%	1.0%
	5	1.5%	1.5%	1.5%	1.5%	1.5%	1.7%
10-unit MURB	3	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
	4	0.6%	0.5%	0.7%	0.7%	0.8%	0.8%
	5	1.4%	1.5%	1.4%	1.3%	1.5%	1.6%

*Where "-" is shown, none of the simulated options meet the targets.

The average incremental costs compared with the baseline construction cost range from below 1% up to approximately 10%, though generally remaining below 3-4% for most archetypes. The smaller homes (laneway and small SFD) have higher incremental capital costs on a percentage basis, which is as expected as certain measures, such as HRVs, drainwater heat recovery, and to some extent windows and walls, are not dependent or not linearly dependent on floor area, meaning the cost does not change linearly with floor area, whereas the base cost of construction estimate, in this report, does scale with floor area. The absolute costs of ECMs to achieve the same steps in these smaller dwellings remain smaller than the absolute costs to achieve them in larger dwellings (this is as expected; some ECMs such as envelope are expected to cost more in larger homes as there is simply more of it.)

Colder climate zones tend to have somewhat higher costs than warmer climate zones. These dwellings would also be expected to gain the most benefit from reduced heating energy use, assisting with improved NPV. The differences in incremental capital cost tend to increase relatively consistently across different archetypes and steps, without significant jumps for the most part. One exception to this is noted in the laneway homes in climate zone 7b versus 8, where climate zone 7b increases in cost and 8 drops. This is due to more ECMs being required in the base case in climate zone 8, so that the minimum construction requirement is higher and the incremental capital cost beyond minimum is reduced.

Compared with similar results in the 2018 Metrics Report, which looked at the lowest first costs as a % change (Table 30 of the 2018 Metrics Report), results appear to generally have reasonably good consistency, within approximately 1% or closer for most individual data points. While there are a few exceptions, such as lower costs in the 2021 results for the Step 5 Quadplex, there does not appear to be a consistent trend or pattern where there are variations (for example based on climate zone or dwelling size.) The overall average of results is within 0.05% of the 2018 Metrics report % ICC, though with variation both above and below for individual data points.

Data showing the averages of the 10 highest NPV and 10 lowest ICC $/GHG abatement cost options are below.

Highest NPV

Table 6-30. Average cost impact of 10 Highest NPV Options

	Step	Highest NPV ($/m² over 20-year life) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Laneway	3	$56	$84	$159	$247	$303	$353
	4	$52	$81	$134	$247	$293	$365
	5	$25	$5	$66	$174	$223	$318
Small SFD	3	$1	$6	$20	$39	$53	$66
	4	$11	$12	$47	$40	$9	$14
	5	$129	$157	$135	$115	$ -	$ -
Medium SFD	3	$1	$6	$18	$31	$40	$49
	4	$1	$5	$4	$18	$29	$41
	5	$35	$41	$25	$6	$27	$42
Medium SFD – 18% WWR	3	$2	$7	$19	$31	$41	$50
	4	$1	$5	$3	$16	$26	$39
	5	$36	$44	$32	$19	$42	$49

	Step	Highest NPV ($/m² over 20-year life) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Medium SFD – 23% WWR	3	$2	$7	$19	$32	$42	$52
	4	$4	$3	$1	$8	$6	$19
	5	$37	$55	$54	$48	$52	$65
Medium SFD – 25 SAR	3	$10	$6	$6	$1	$8	$17
	4	$23	$28	$30	$37	$60	$64
	5	$50	$86	$71	$69	$ -	$ -
Medium SFD – 50 SAR	3	$27	$35	$31	$35	$24	$15
	4	$27	$55	$33	$46	$70	$94
	5	$64	$110	$87	$82	$ -	$ -
Large SFD	3	$3	$8	$19	$31	$40	$48
	4	$2	$3	$12	$26	$36	$47
	5	$38	$38	$31	$7	$20	$36
Large SFD – 18% WWR	3	$3	$8	$19	$31	$40	$48
	4	$3	$1	$11	$24	$34	$46
	5	$47	$56	$59	$21	$45	$ -
Large SFD – 23% WWR	3	$1	$4	$14	$28	$37	$45
	4	$11	$7	$15	$9	$3	$14
	5	$9	$8	$19	$25	$14	$5
Large SFD – 25 SAR	3	$12	$32	$31	$36	$70	$76
	4	$72	$ -	$ -	$ -	$ -	$ -
	5	$11	$32	$21	$40	$62	$92
Large SFD – 50 SAR	3	$11	$35	$23	$36	$62	$90
	4	$76	$ -	$ -	$ -	$ -	$ -
	5	$3	$8	$19	$31	$40	$48
Quadplex	3	$46	$65	$121	$189	$236	$267
	4	$39	$59	$122	$191	$240	$279
	5	$11	$7	$ -	$163	$ -	$ -
Row	3	$19	$25	$40	$55	$66	$77
	4	$19	$26	$38	$53	$65	$78

	Step	Highest NPV ($/m² over 20-year life) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
	5	$6	$2	$20	$29	$34	$47
10-unit MURB	3	$41	$54	$105	$144	$179	$197
	4	$42	$60	$109	$154	$194	$220
	5	$41	$59	$106	$156	$198	$227

Lowest ICC $/GHG Cost Abatement

Table 6-31. Average cost impact of 10 Lowest GHG Cost Abatement Options

	Step	Lowest Incremental Capital Cost of GHG Abatement ($/m² ICC/tCO2e saved) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Laneway	3	7.9	9.6	11.8	8.3	10.8	6.4
	4	11.3	13.3	13.0	12.7	15.5	9.8
	5	15.1	19.5	21.0	21.5	91.4	17.5
Small SFD	3	4.4	4.3	3.4	2.4	2.2	1.9
	4	6.2	5.1	4.1	2.7	3.0	2.5
	5	9.1	8.8	7.0	5.3	-	-
Medium SFD	3	3.2	2.8	2.1	1.6	1.3	1.2
	4	3.8	3.4	2.5	1.9	1.9	1.7
	5	5.6	5.3	4.2	2.9	2.7	2.7
Medium SFD – 18% WWR	3	3.2	2.8	2.1	1.5	1.4	1.2
	4	3.9	3.3	2.5	2.0	2.1	1.9
	5	5.7	5.4	4.4	3.1	3.2	3.0
Medium SFD – 23% WWR	3	3.3	2.8	2.2	1.6	1.4	1.2
	4	4.0	3.6	2.7	2.0	2.2	1.9
	5	6.1	6.1	5.4	4.0	3.5	3.3
Medium SFD – 25 SAR	3	3.4	3.2	2.5	1.8	1.8	1.6
	4	3.8	3.6	2.9	2.1	2.3	2.0
	5	6.3	6.8	5.7	4.3	-	-
	3	3.2	3.1	2.3	1.7	1.7	1.5

	Step	Lowest Incremental Capital Cost of GHG Abatement ($/m² ICC/tCO2e saved) Average of 10 Best					
		CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Medium SFD – 50 SAR	4	3.6	3.6	2.8	2.0	2.2	2.0
	5	6.4	7.1	5.6	4.2	-	-
Large SFD	3	2.5	2.2	1.6	1.2	1.0	0.9
	4	3.4	2.9	2.1	1.6	1.6	1.4
	5	6.7	6.1	4.6	3.0	2.6	2.6
Large SFD – 18% WWR	3	2.5	2.2	1.6	1.2	1.0	0.9
	4	3.5	3.1	2.4	1.6	1.7	1.5
	5	7.3	6.7	6.1	3.4	3.5	-
Large SFD – 23% WWR	3	2.7	2.4	1.9	1.3	1.2	1.2
	4	4.1	3.5	2.8	1.8	2.7	2.4
	5	2.3	2.3	2.0	1.4	1.9	1.5
Large SFD – 25 SAR	3	2.6	2.8	2.8	1.9	2.8	1.9
	4	7.4	-	-	-	-	-
	5	2.1	2.0	1.6	1.2	1.3	1.1
Large SFD – 50 SAR	3	2.3	2.5	2.0	1.5	1.8	1.6
	4	6.6	-	-	-	-	-
	5	2.5	2.2	1.6	1.2	1.0	0.9
Quadplex	3	4.8	5.5	6.2	6.4	6.7	7.2
	4	6.6	8.3	10.3	8.6	9.2	9.1
	5	14.0	15.0	-	12.7	-	-
Row	3	1.4	1.1	0.9	0.6	0.5	0.5
	4	1.4	1.2	1.0	0.8	0.8	0.7
	5	2.7	2.2	1.8	1.3	1.2	1.1
10-unit MURB	3	6.6	6.5	6.1	5.5	5.3	5.4
	4	7.2	8.0	8.0	7.1	6.8	6.6
	5	13.0	12.7	11.9	10.4	10.2	10.2

As with the Part 3 buildings, the table above uses $ ICC / GHG saved. This methodology was used because the NPV was fairly widely varied in both the previous report and this one, whereas the ICC metric was somewhat more consistent across Steps and locations, allowing greater clarity and simplicity in understanding patterns across the analysis.

7 Summary and Recommendations

7.1 Impact of NECB 2020

In updating to NECB 2020 from NECB 2015 as the base code, the base code becomes more efficient, with average energy performance increases of 12% for retail, 11% for hotel, 33% for office, and 15% for MURB.

The goal is for the new minimum target to require better performance than NECB 2020; and in addition, for performance to be at least 20% better than the 2018 BCBC.

Table 7-1. Recommendations for Updated BC Energy Step Code Targets – Part 3

Archetype	Recommendation for New Minimum Step
MURB (high- and low-rise)	Step 2
Office	Step 2
Retail	Step 2
Hotel	Step 2

This suggested approach recommends an incremental increase in the minimum Step for all archetypes, which aligns with previous messaging and industry perception, as well as making allowance for the significant variation in measures required based on elements such as building shape, program variation, etc.

Both TEDI and TEUI are considered in comparing against NECB to make recommendations; GHGI targets are preliminary as of this report and are not considered. NECB would consider only TEUI for compliance, however TEDI is a significant metric in the BC Energy Step Code and has been considered within the comparison.

Step 2 would beat either the TEDI or TEUI of NECB 2020 for all archetypes modeled, on average across all climate zones. In order to meet the TEUI, a slight increase in stringency of the TEUI target was needed for office and retail.

Step 2 would also show more than 20% savings for either TEDI or TEUI of NECB 2015 (BCBC 2018), with the exception of the retail archetype, which shows 19% savings. The difference between 19% and 20% is well within the margin of error of the nature of an archetype modelling study of this sort and is not expected to be a significant reason to increase the minimum Step for this archetype beyond Step 2.

7.2 GHG/GHGI Targets

The achievability of specific GHG or GHGI targets will depend significantly on the choice of emissions factors to be used in modelling. The City of Vancouver Modelling Guidelines v2.0 emissions factors are used throughout this report.

A further complication is the Fort Nelson grid and local isolated grids, where low-GHG power may not be available. In those areas, it may be necessary to look at future greening of the grid, additional local renewable supply, or a focus on alternative energy sources in order to achieve

deep greenhouse gas emission reductions. For code compliance, the simplest solution may be to have static emission factors for the entire province.

The following targets are initially proposed, targeting 3 levels of GHG reduction and with the intent of driving decarbonization measures at each level.

- Medium: intended to require decarbonization of one major system (space heating or hot water).
- Low: intended to require both major systems to decarbonize, but still allows for high-carbon fuel backup heating, cooking loads, or similar.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

Table 7-2. Preliminary Proposed GHGI Targets for Part 3 Buildings

Archetype	Medium	Low	Zero Carbon Ready
MURB	7	3	1.8
Office	5	3	1.5
Retail	6	3	2
Hotel	9	4	2

Feasible design measures and cost impacts of these targets are analyzed in detail; the incremental capital cost of decarbonization measures compared against that Step's base case remains below 2.5% for all archetypes.

7.3 Overheating Risk

With the exception of climate zone 5, all other climate zones have a combination of modeled passive cooling options to meet a 200 hour maximum, (considered as an initial target for analysis based on the City of Vancouver Energy Modelling Guidelines v2).

Very few of the options modeled (for any range of envelope or WWR inputs) would meet a 20 hour maximum for vulnerable populations, based on future-projected 2020s and 2050s weather. It may be possible to meet the 20-hour target based on CWEC 2016 weather files that are backward-looking and have cooler temperatures; in addition it may be possible to meet this target with project-specific design optimization. However, active cooling or additional design measures that fall beyond the range of the typical measures included in this study would likely be required for most buildings to meet 20 hours for vulnerable populations based on any future-projected weather.

Most projects in climate zone 5 are also unlikely to be able to use only passive cooling measures to achieve a 200 or fewer overheated hours target using future-projected weather files, though project-specific design optimization may certainly be possible leading to improved outcomes compared with a generalized archetype study.

In addition, as the climate warms, these targets become more challenging to meet, with most climate zones not able to meet a 200 hour maximum based on 2050s weather. While the

evaluation was done using 2020s comfort criteria to evaluate overheating limits, and limits were not changed to account for occupant comfort at somewhat increased temperatures based on acclimatizing to more warmth, this is nevertheless indicative of significant warming, with projects in climate zone 5 potentially encountering in the range of 700 overheated hours during a typical weather year (approximately 2 months' worth of 12-hour days).

A secondary metric was also reported within the analysis, hours over 26°C. This allows for a more fixed comparison of hours between climate zones and over time.

In addition to passive cooling measures, partial or full mechanical cooling may be required to maintain occupant comfort, particularly during extreme weather and smoke events that are increasing in frequency. During extreme heat waves such as those seen across much of BC recently, as well as during periods of poor air quality due to forest fires, one of the most effective passive cooling measures, operable windows, is much less useful or not viable. While passive cooling measures do help to mitigate the impacts of such events, and reduce the risk to occupants in the event of mechanical cooling or power failure, passive cooling by itself will no longer be sufficient to provide for adequate occupant comfort and safety. Both passive and active strategies should be encouraged in combination.

7.4 Part 9

The addition of a smaller/laneway archetype highlighted the increased ECMs that are required for smaller buildings, as well as the higher incremental capital cost on a percentage of base construction cost. However, it should be noted that the absolute costs of ECMs remain lower on an absolute cost basis than those for larger homes.

Analysis of shape factors and window to wall ratios showed significant impacts on the ECMs required as well as the costs of compliance (in both absolute and percentage increase terms) as the surface to floor area ratio or window to wall ratio increase. In general, a 50% increase in SAR was seen to approximately double the incremental cost of compliance. A 5% increase or decrease in window to wall ratio had a much smaller impact on incremental capital cost, in the range of 0.2-0.3%, except for the highest step in the coldest climate zones, which had over 1% incremental capital cost impact. This analysis may be useful for design teams in considering design decisions such as ceiling heights, articulation, and window area, as well as helping to inform local jurisdictions, who may wish to examine their other policies for alignment with these goals.

Three levels of GHG Target are proposed for Part 9 buildings, with the intent of driving decarbonization design measures at each level.

- Medium: The larger of either heating or DHW must use a low-carbon fuel.
- Low: Allows for smaller end uses such as cooking or gas dryers to use high-carbon fuel, or allows use of a small portion of high carbon fuel for large end uses (e.g. backup heating) but requires low-carbon fuel for most end-uses.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

A per-unit base allowance as well as a per-unit maximum cap are considered, with targets scaling by unit floor area in between. A prescriptive option is also proposed, aligned with the decarbonization measures intent for modeled targets.

The current draft proposed targets used for analysis are as follows:

	All Buildings: GHG Base Allowance per unit	OR	The smaller of GHG intensity or the maximum absolute cap, for the unit size.		OR	Prescriptive option (under consideration)
			Building GHG Intensity	GHG Maximum Cap per unit		
	kg CO2e per unit		kgCO2e/m2/year	kg CO2e per unit		
Medium	1050		6	2400		Decarbonize heating.
Low	440		2.5	800		Only backup heating or auxiliary uses (cooking, fireplaces, etc.) are allowed to use high carbon fuel.
Zero Carbon Ready	265		1.5	500		Project is fully decarbonized.

There are a number of end uses, such as supplemental space heating fireplaces as well as exterior uses, that would be excluded from the models under EnerGuide Rating System protocols; and the fuel source and carbon content of appliances such as cooktops and dryers may not be consistently accounted for in common practice. These could impact GHGI compliance. The potential use of specific modelling guidelines or additional prescriptive requirements could be considered.

Finally, the incremental capital costs are summarized for each Step and archetype across all climate zones. The average incremental costs compared with the baseline construction cost range from below 1% up to approximately 10%, though generally remaining below 3-4% for most archetypes. The values are within similar ranges to the 2018 Metrics Report, and tend to increase as Steps increase, as expected. They also increase for colder climate zones. The percentage increases are higher for smaller dwellings, though the absolute increases are smaller.

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2022-09-29

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Appendix A: Detailed Energy Modelling Inputs

Part 3 Energy Modelling Inputs

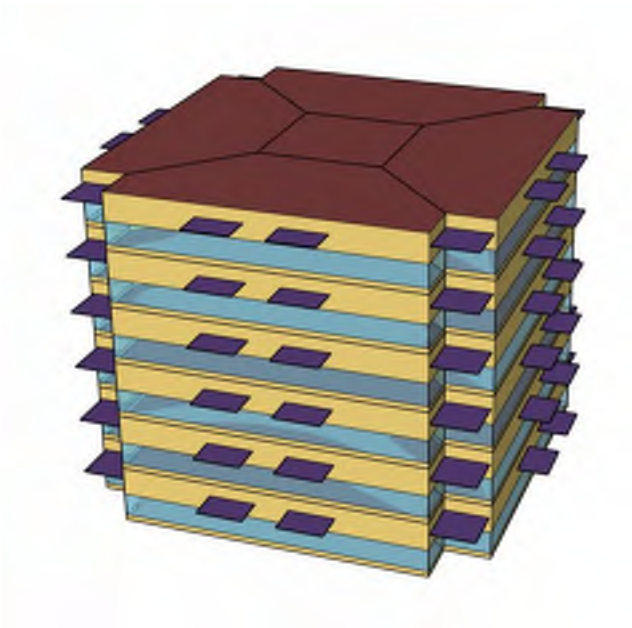
High-Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Climate Zone	Climate Zone 4, 5, 6, 7a		
Weather File	Vancouver Airport CWEC 2016, Kamloops AP CWEC 2016, Prince George Intl AP CWEC 2016, Fort St. John – North Peace Rgnl AP CWEC 2016		
Software	EnergyPlus v9.4		
Building Area	18,000 m^2 conditioned floor area (approx. 90% suite area, 10% corridor/common areas) Parking area varies: low density 2504 m^2, mid density 3512 m^2, high density 4014 m^2		
Storeys	30		
Building Description (space types)	Suites (approx. 90% of floor area) Corridor (approx. 10% of floor area) Parkade No amenity spaces modeled		
Visual			
Zoning	Suites exterior, corridor/core interior. Several suites along each façade are combined, which allows variations in suite size within the model (each façade modeled as separate zone to account for variations in load). Zone multipliers used for intermediate floors.		

High-Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Internal Loads and Schedules			
Internal Loads (CoV Modelling Guidelines v2)	Suites: Plug 5 W/ m^2 (fully electric) People: Per suite count (1 person for studio, 2 people for 1-bd, 1 additional person for each bedroom thereafter) DHW: 0.0016 L/s/person Corridor: (NECB 2017 defaults) Plug 1 W/ m^2 People: 100 m^2/occupant DHW: none additional to suites		
Suite Count/ Density	High: 25.2 m^2/person, mid: 28.8 m^2/person, low: 40.2 m^2/person (based on 2018 Metrics Report) Calculations based on: for mid density = 28.8 m^2/person Studio: 28.8 m^2/suite, 30% of units 1-bd: 57.6 m^2/suite, 50% of units 2-bd: 86.4 m^2/suite, 20% of units Average suite size = 54.7 m^2/suite, 294 units For high density, 47.9 m^2/suite, 337 units For low density, 76.8 m^2/suite, 210 units		
Operating Schedules	NECB Schedule G 2017 throughout.		
Temperature Setpoints	22°C heating 24°C cooling No night setbacks Parkade unconditioned (exhaust fans only)		
Interior Lighting	Suites: 5 W/m^2 Corridor: Varies (starts at 4.4 W/m^2 and decreases with savings)	Suites: 5 W/m^2 Corridor: 7.1 W/m^2	Suites: 5 W/m^2 Corridor: 4.4 W/m^2
Exterior Lighting	5 kW allowance, controlled by photocell		
Additional Loads	Elevators 3 kW / elevator x 3 elevators Per CoV Modelling Guidelines v2 Suite exhaust fans 2h/day, 150W/suite		

High-Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Envelope			
Walls	Varies: R-4, 7, 10, 20, 40	De-rated by 40% to allow for thermal bridging. See discussion section. CZ4 – R-10.8 CZ5 – R-12.3 CZ6 – R-13.8 CZ7a – R-16.2	CZ4 – R-19.6 CZ5 – R-21.4 CZ6 – R-23.7 CZ7a – R-26.4
Roofs	Varies: R-20, 40	CZ4 – R-25.0 CZ5 – R-31.0 CZ6 – R-31.0 CZ7a – R-35.7	CZ4 – R-34.6 CZ5 – R-36.4 CZ6 – R-41.1 CZ7a – R-46.9
Windows	Varies: USI-2.5, 2, 1.6, 1.2, 0.8 SHGC Varies: 0.3, 0.4	CZ4 – USI-2.4 CZ5 – USI-2.2 CZ6 – USI-2.2 CZ7a – USI-2.2 SHGC 0.3 for all	CZ4 – USI-1.9 CZ5 – USI-1.9 CZ6 – USI-1.73 CZ7a – USI-1.73 SHGC 0.3 for all
Window-to-wall ratio	Varies: 20%, 40%, 60%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%
Shading	Balconies		
Soffit / exposed floor	None		
Parkade	No heat transfer between parkade ceiling and lowest floor (idealized to allow for changes in parkade area with unit density)		
Infiltration	Varies: 0.2 L/s/m^2, 0.1 L/s/m^2, 0.01 L/s/m^2 Of exterior wall area Constant flow (per CoV Modelling Guidelines v2)	0.2 L/s/m^2	0.2 L/s/m^2
Mechanical Systems			
Air-side system description	MUA supplying air to corridors. Separate ERV or ventilator for suites. For baseboard option, all corridors and suites have electric baseboard, and suites also have PTAC for cooling only. For FC option, all corridors and suites have FC.		

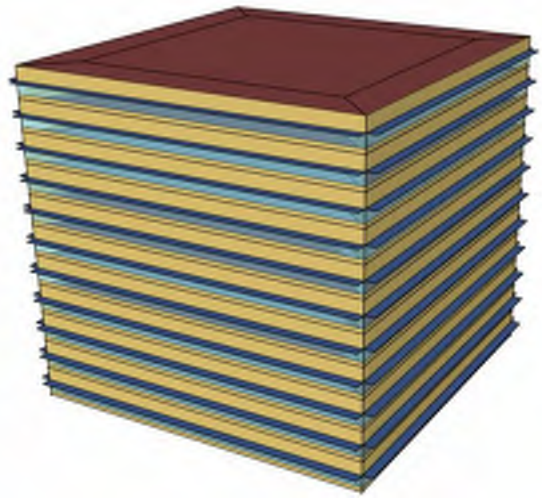
High-Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Air terminal units	Varies: Electric baseboard with PTAC for cooling. PTAC fans cycling (not used for ventilation), 640Pa at 40% 4-pipe fan coil, 0.2 W/cfm, fans cycling (not used for ventilation).	Same as proposed (note FC fans lower than NECB allowance; not claiming as ECM for costing since this is fairly typical design. No change between NECB 2015 and 2020. In general this approach appears to align with the 2018 Metrics Report.)	
Heat recovery	Varies: None, 60%, 80% (in suites only; no heat rec in corridor)	Suites: CZ 4, 5, 6: None CZ 7a: 65% None in corridor.	
Economizer	None (100% OA and no boost)	None	None
Central air systems	MUA supplying air to corridors. 1 W/cfm, no heat rec, no economizer (100% OA), no return fan. Warmest reset control between 13C and 18C – supply air at highest possible temp to meet cooling loads for all corridor zones. Cooling is DX in baseboard model, chilled water in FC model. Electric heating. Separate ERV or central vent unit for suites. 1 W/cfm. Heat rec varies, see above. No economizer. Uncontrolled by temperature; supply temperature floats. Electric preheat set to -5.	Same as proposed. (See note in air terminals re fan power)	
Heating and Cooling Efficiency	Baseboard model: PTAC COP 3.81 All heating elec. resistance FC model: Chiller COP 5.334 Heating options: Standard efficiency (86%) Condensing (95%) ASHP (annual heating COP 3.2 CZ4, 3.1 CZ5, 3.0 CZ6, 2.5 CZ7a, 2.2 CZ7b, 2.0 CZ8)	Baseboard model: PTAC COP: 3.28 All heating elec. resistance FC model: Chiller (screw) COP 2.8 Boiler: 83%	Baseboard model: PTAC COP: 3.8 All heating elec. resistance FC model: Chiller (screw): COP 5.334 Boiler 90%

High-Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Night cycle control	N/A, all operates 24/7		
Outdoor air flow rates	ASHRAE 62.1-2016 2.5 L/s/person + 0.3 L/s/ m^2 (note: model input varies by suite density; number of people varies; combined OA rate varies between approx. 0.36 L/s/ $m^2$and 0.4 L/s/ m^2) Corridor: 0.3 L/s/ m^2		
Parkade	4h/day Exhaust fans 0.5 W/cfm 0.75 cfm/sf exhaust		
DHW			
DHW Load	20% savings (low flow fixtures)	No savings (see internal loads)	
DHW Heating Equipment	Nat gas: 95% Elec resistance	Nat gas: 80% Elec resistance	Nat gas: 90% Elec resistance

Low Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Climate Zone	Climate Zone 4, 5, 6, 7a, 7b, 8		
Weather File	Vancouver Airport CWEC 2016, Kamloops AP CWEC 2016, Prince George Intl AP CWEC 2016, Fort St. John – North Peace Rgnl AP CWEC 2016, Fort Nelson – Northern Rockies Rgnl AP CWEC 2016, Yellowknife AP CWEC 2016		
Software	EnergyPlus v9.4		
Building Area	Same space proportions as high-rise MURB; scaled down for reduced # storeys Uses same model as high-rise; results are per floor area. Costing is different as systems are likely to be constructed differently, e.g. wood frame vs. non-combustible. Climate zones 7b and 8 added to the analysis for low-rise.		
Storeys			
Building Description (space types)			
Visual			
Zoning	Suites exterior, corridor/core interior. Several suites along each façade are combined, which allows variations in suite size within the model (each façade modeled as separate zone to account for variations in load). Zone multipliers used for intermediate floors.		
Internal Loads and Schedules			
Internal Loads and Schedules	See high rise MURB		

Low Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Envelope			
Walls	Varies: R-4, 7, 10, 20, 40	De-rated by 25% to allow for thermal bridging. (Less de-rating than for high rise/non-combustible construction to allow for wood framed construction). See discussion section. CZ4 – R-13.5 CZ5 – R-15.3 CZ6 – R-17.2 CZ7a – R-20.3 CZ7b – R-20.3 CZ8 – R-23.3	CZ4 – R-19.6 CZ5 – R-21.4 CZ6 – R-23.7 CZ7a – R-26.4 CZ7b – R-29.9 CZ8 – R-34.4
Roofs	Varies: R-20, 40	CZ4 – R-25.0 CZ5 – R-31.0 CZ6 – R-31.0 CZ7a – R-35.1 CZ7b – R-35.1 CZ8 – R-40.0	CZ4 – R-34.6 CZ5 – R-36.4 CZ6 – R-41.1 CZ7a – R-46.9 CZ7b – 48.5 CZ8 – 51.6
Windows	Varies: USI-2.5, 2, 1.6, 1.2, 0.8 SHGC Varies: 0.3, 0.4	CZ4 – USI-2.4 CZ5 – USI-2.2 CZ6 – USI-2.2 CZ7a – USI-2.2 CZ7b – USI-2.2 CZ8 – USI-1.6 SHGC 0.3 for all	CZ4 – USI-1.9 CZ5 – USI-1.9 CZ6 – USI-1.73 CZ7a – USI-1.73 CZ7b – USI-1.44 CZ8 – USI-1.44 SHGC 0.3 for all
Window-to-wall ratio	Varies: 20%, 40%, 60%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28% CZ7b – 22% CZ8 – 20%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28% CZ7b – 22% CZ8 – 20%
Shading	Balconies only		
Soffit / exposed floor	See high rise MURB		
Parkade			
Infiltration			

Low Rise MURB			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Mechanical Systems			
Mechanical Systems	See high rise MURB		
Heat recovery	Varies: None, 60%, 80% (in suites only; no heat rec in corridor)	Suites: CZ 4, 5, 6: None CZ 7a, 7b, 8: 65% None in corridor.	
DHW			
DHW	See high rise MURB		

<table>
<tr><th colspan="4">Office</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Climate Zone</td><td colspan="3">Climate Zone 4, 5, 6, 7a</td></tr>
<tr><td>Weather File</td><td colspan="3">Vancouver Airport CWEC 2016, Kamloops AP CWEC 2016, Prince George Intl AP CWEC 2016, Fort St. John – North Peace Rgnl AP CWEC 2016</td></tr>
<tr><td>Software</td><td colspan="3">EnergyPlus v9.4</td></tr>
<tr><td>Building Area</td><td colspan="3">18,209 m^2 conditioned floor area</td></tr>
<tr><td>Storeys</td><td colspan="3">10</td></tr>
<tr><td>Building Description (space types)</td><td colspan="3"><table><tr><th>Space Type</th><th>% of total area</th></tr><tr><td>Office</td><td>55%</td></tr><tr><td>Conference</td><td>15%</td></tr><tr><td>Corridor</td><td>16%</td></tr><tr><td>Reception</td><td>6%</td></tr><tr><td>Lobby</td><td>6%</td></tr><tr><td>Storage</td><td>2%</td></tr><tr><td>Parking</td><td>Modeled as exterior loads</td></tr></table></td></tr>
<tr><td>Visual</td><td colspan="3">  </td></tr>
<tr><td>Zoning</td><td colspan="3">Zoned as core and perimeter model with 10 storeys. Office uses average of various space use internal loads. Where substantial IT process loads are added; they are added individually to a single dedicated smaller zone rather than distributed throughout. Zone multipliers are used for intermediate floors.

Significant impacts of reduced variability between different spaces are mitigated by accounting for a typical office ventilation effectiveness in a mixed air system when modelling VAV (0.56 used), and by using temperature-first rather than airflow-first controls for the VAV system, which means if large interior zone requires cooling, the system temperature will drop for the whole system, increasing reheat requirements for the system but not massively increasing fan power to meet loads for a single zone.</td></tr>
</table>

<table>
<tr><th colspan="4">Office</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td colspan="4">Internal Loads and Schedules</td></tr>
<tr><td>Internal Loads (NECB 2017 defaults)</td><td colspan="3">A program variation between default NECB 2017 occupancy, and double that level of occupancy (including people, associated plug loads (i.e. computers), and DHW).

Note that NECB 2017 was the most recent fully available version of NECB at the time of modelling and these loads are used throughout. See Section 2.1.1 for more information.

<table>
<tr><th></th><th>% of total area</th><th>People - Default (m^2/pers)</th><th>People - Double (m^2/pers)</th><th>Default Plug W/ m^2</th><th>Double Plug W/ m^2</th></tr>
<tr><td>Office</td><td>55%</td><td>20</td><td>10</td><td>7.5</td><td>15</td></tr>
<tr><td>Conference</td><td>15%</td><td>2</td><td>2</td><td>1</td><td>1</td></tr>
<tr><td>Corridor</td><td>16%</td><td>100</td><td>100</td><td>0</td><td>0</td></tr>
<tr><td>Reception</td><td>6%</td><td>3.33</td><td>3.33</td><td>1</td><td>1</td></tr>
<tr><td>Lobby</td><td>6%</td><td>10</td><td>10</td><td>1</td><td>1</td></tr>
<tr><td>Storage</td><td>2%</td><td>100</td><td>100</td><td>1</td><td>1</td></tr>
<tr><td>Parking</td><td>Ext loads</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Average</td><td>100%</td><td>30.10</td><td>24.60</td><td>4.42</td><td>8.54</td></tr>
</table>
DHW loads: default 106,523W peak
Double (office area only): 165,111W peak</td></tr>
<tr><td>Operating Schedules</td><td colspan="3">NECB Schedule A 2017 throughout.</td></tr>
<tr><td>Temperature Setpoints</td><td colspan="3">22°C heating (daytime weekdays)
24°C cooling (daytime weekdays)
Night setbacks to 18°C heating, 30°C cooling.
Parkade unconditioned (exhaust fans only)</td></tr>
<tr><td>Interior Lighting</td><td colspan="3">Proposed model varies: 0% and 25% LPD savings compared with NECB 2020
<table>
<tr><th></th><th>% of total area</th><th>NECB 2015 Baseline Lights</th><th>NECB 2020 Baseline Lights</th></tr>
<tr><td>Office</td><td>55%</td><td>10.6</td><td>6.6</td></tr>
<tr><td>Conference</td><td>15%</td><td>13.3</td><td>10.5</td></tr>
<tr><td>Corridor</td><td>16%</td><td>7.1</td><td>4.4</td></tr>
<tr><td>Reception</td><td>6%</td><td>5.9</td><td>2.5</td></tr>
<tr><td>Lobby</td><td>6%</td><td>9.7</td><td>9</td></tr>
<tr><td>Storage</td><td>2%</td><td>6.8</td><td>4.1</td></tr>
<tr><td>Parking</td><td>Ext loads</td><td>2.1</td><td>1.5</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Average</td><td>100%</td><td>9.84</td><td>6.23</td></tr>
</table></td></tr>
</table>

Office			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Exterior Lighting	3 kW allowance, controlled by photocell		
Additional Loads	Elevators 3 kW / elevator x 3 elevators Per CoV Modelling Guidelines v2 General exhaust: 12 kW, 2h/day IT Load: Varies: None, 4 kW		
Envelope			
Walls	Varies: R-4, 7, 10, 20, 40	De-rated by 40% to allow for thermal bridging. See discussion section. CZ4 – R-10.8 CZ5 – R-12.3 CZ6 – R-13.8 CZ7a – R-16.2	CZ4 – R-19.6 CZ5 – R-21.4 CZ6 – R-23.7 CZ7a – R-26.4
Roofs	Varies: R-20, 40	CZ4 – R-25.0 CZ5 – R-31.0 CZ6 – R-31.0 CZ7a – R-35.7	CZ4 – R-34.6 CZ5 – R-36.4 CZ6 – R-41.1 CZ7a – R-46.9
Windows	Varies: USI-2.5, 2, 1.6, 1.2, 0.8 SHGC Varies: 0.3, 0.4	CZ4 – USI-2.4 CZ5 – USI-2.2 CZ6 – USI-2.2 CZ7a – USI-2.2 SHGC 0.3 for all	CZ4 – USI-1.9 CZ5 – USI-1.9 CZ6 – USI-1.73 CZ7a – USI-1.73 SHGC 0.3 for all
Window-to-wall ratio	Varies: 20%, 40%, 60%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%
Shading	1.2m overhang above perimeter windows – will increase TEDI but make some allowance for occupant comfort (strictly NECB baseline should remove; leaving in to make allowance for glare/solar gain reduction)		
Soffit / exposed floor	None		
Parkade	No heat transfer between parkade ceiling and lowest floor (idealized to allow for changes in parkade area with unit density)		

Office			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Infiltration	Varies: 0.2 L/s/m^2, 0.1 L/s/m^2, 0.01 L/s/m^2 Of exterior wall area Constant flow (per CoV Modelling Guidelines v2)	0.2 L/s/m^2	0.2 L/s/m^2
Mechanical Systems			
Mech system description	Options: VAV mixed air system with hydronic heating and cooling, zone reheat (with warmest reset). 4-pipe FC with DOAS (hydronic heat/cool)	VAV with hydronic heating and cooling, zone reheat. No warmest reset (constant SAT)	VAV with hydronic heating and cooling, zone reheat. Warmest reset (SAT to meet the cooling needs of the warmest zone; modeled as temp first then airflow reset)
Air terminal units	VAV: 30% constant minimum or min OA rate, whichever is higher. Zone terminals increase flow for cooling (not increased for heating, to avoid overestimating fan power for large interior zone in core and shell model). Zone reheat provided by hydronic coils. OA control stays at constant min flow rate rather than proportional (OA may be higher % of total flow when total system flow is low) FC: 0.3 W/cfm zone fans, operating continuously during occupied hours, with variable flow (min limit 25% flow fraction). Hydronic heating and cooling.	VAV min limit 2 L/s/ m^2 or min OA, whichever is higher. Zone terminals increase flow for cooling (not increased for heating, to avoid overestimating fan power for large interior zone in core and shell model). Zone reheat provided by hydronic coils. OA control stays at constant min flow rate rather than proportional (OA may be higher % of total flow when total system flow is low)	VAV min limit 30% or min OA, whichever is higher. Zone terminals increase flow for cooling (not increased for heating, to avoid overestimating fan power for large interior zone in core and shell model). Zone reheat provided by hydronic coils. OA control stays at constant min flow rate rather than proportional (OA may be higher % of total flow when total system flow is low)
Heat recovery	Varies: None, 60%, 80%	50% effective heat recovery for all CZs	50% effective heat recovery at CZ5 and colder.
Economizer	Differential enthalpy economizer for VAV. No economizer for DOAS (100% OA, no boost.)	Differential enthalpy economizer	Differential enthalpy economizer

<table>
<tr><th colspan="4">Office</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Central air systems</td><td>VAV system: Same as baselines.

DOAS with FC:
Sizing central system for ventilation rate.
Fans: 1000 Pa at 55% efficiency supply fan
250 Pa at 30% efficiency return fan.
Night cycle zone fans only, 100% recirc.</td><td colspan="2">Mixed air VAV system
Sizing: 21C heating temp diff, 11C cooling temp diff
Sizing factor: 1.3 in heating, 1.1 in cooling

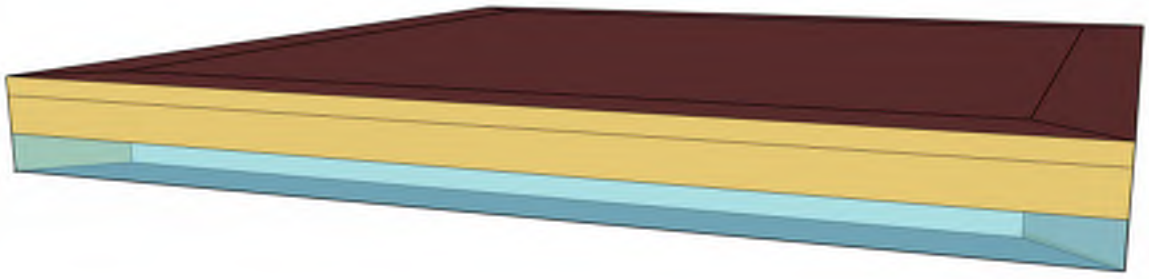
Fans: 1000 Pa at 55% efficiency supply fan
250 Pa at 30% efficiency return fan

No night cycle.</td></tr>
<tr><td>Heating and Cooling Efficiency</td><td>Boiler options:
Standard efficiency (86%)
Condensing (95%)
ASHP (annual heating COP 3.2 CZ4, 3.1 CZ5, 3.0 CZ6, 2.5 CZ7)

Chiller: COP 5.771</td><td>Boiler 83% Et
Chiller COP 2.802</td><td>Boiler 90% Et
Chiller COP 5.771</td></tr>
<tr><td>Outdoor air flow rates</td><td colspan="3">ASHRAE 62.1-2016
<table><tr><th></th><th>% of total area</th><th>Outdoor Air L/s/person</th><th>Outdoor Air L/s/ m^2</th><th>Combined OA – default occupancy (L/s/ m^2)</th><th>Combined OA – double occupancy</th></tr><tr><td>Office</td><td>55%</td><td>10</td><td></td><td>0.43</td><td>0.55</td></tr><tr><td>Conference</td><td>15%</td><td>10</td><td></td><td>1.55</td><td>1.55</td></tr><tr><td>Corridor</td><td>16%</td><td></td><td>0.25</td><td>0.30</td><td>0.30</td></tr><tr><td>Reception</td><td>6%</td><td>8</td><td></td><td>1.05</td><td>1.05</td></tr><tr><td>Lobby</td><td>6%</td><td></td><td>0.25</td><td>0.30</td><td>0.30</td></tr><tr><td>Storage</td><td>2%</td><td></td><td>0</td><td>0</td><td>0</td></tr></table>
Using NECB default or double occupancy to calculate number of occupants.

Applying ventilation effectiveness of 0.56 for VAV mixed air system (same factor as 2018 Metrics Report), and 1 for DOAS system.
<table><tr><th></th><th>Ventilation Eff</th><th>Combined OA with vent eff – default occupancy</th><th>Combined OA with vent eff – double occupancy</th></tr><tr><td>VAV</td><td>0.56</td><td>1.1 L/s/ m^2 (0.21 cfm/sf)</td><td>1.2 L/s/ m^2 (0.23 cfm/sf)</td></tr><tr><td>DOAS</td><td>1</td><td>0.6 L/s/ m^2 (0.12 cfm/sf)</td><td>0.7 L/s/ m^2 (0.13 cfm/sf)</td></tr></table></td></tr>
</table>

Office			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Parkade	4h/day Exhaust fans 17844 W total allowance Lighting 9105 W total, operating 24/7.		
DHW			
DHW Load	20% savings (low flow fixtures) 40% savings (low flow fixtures + drain water heat recovery)	No savings (see internal loads)	
DHW Heating Equipment	Nat gas: 95% Elec resistance	Nat gas: 80% Elec resistance	Nat gas: 90% Elec resistance

<table>
<tr><th colspan="4">Retail</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Climate Zone</td><td colspan="3">Climate Zone 4, 5, 6, 7a</td></tr>
<tr><td>Weather File</td><td colspan="3">Vancouver Airport CWEC 2016, Kamloops AP CWEC 2016, Prince George Intl AP CWEC 2016, Fort St. John – North Peace Rgnl AP CWEC 2016</td></tr>
<tr><td>Software</td><td colspan="3">EnergyPlus v9.4</td></tr>
<tr><td>Building Area</td><td colspan="3">4,502 m^2 conditioned area</td></tr>
<tr><td>Storeys</td><td colspan="3">1</td></tr>
<tr><td>Building Description (space types)</td><td colspan="3">Two program variations modeled:
Big box (100% retail) and mall (includes common areas, food court, etc)
<table><tr><td>Building Type</td><td>Space Type</td><td>% of Area</td></tr><tr><td>Mall</td><td>Retail</td><td>40%</td></tr><tr><td>Mall</td><td>Warehouse</td><td>30%</td></tr><tr><td>Mall</td><td>Dining</td><td>5%</td></tr><tr><td>Mall</td><td>Concourse</td><td>20%</td></tr><tr><td>Mall</td><td>Food Prep</td><td>5%</td></tr><tr><td>Big Box</td><td>Retail</td><td>100%</td></tr></table></td></tr>
<tr><td>Visual</td><td colspan="3">  </td></tr>
<tr><td>Zoning</td><td colspan="3">Zoned as core and perimeter model with single storey. Big box retail is 100% retail space use; mall uses average of various space use internal loads.</td></tr>
</table>

<table>
<tr><th colspan="4">Retail</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td colspan="4">Internal Loads and Schedules</td></tr>
<tr><td>NECB Default Loads</td><td colspan="3">NECB 2017 defaults.
Note that NECB 2017 was the most recent fully available version of NECB at the time of modelling and these loads are used throughout. See Section 2.1.1 for more information.

<table>
<tr><th>Building Type</th><th>Space Type</th><th>% of Area</th><th>Occupant Density (m^2/pers)</th><th>Plug (W/m^2)</th><th>SHW (W/pers)</th></tr>
<tr><td>Mall</td><td>Retail</td><td>40%</td><td>30</td><td>2.5</td><td>40</td></tr>
<tr><td>Mall</td><td>Warehouse</td><td>30%</td><td>50</td><td>1</td><td>65</td></tr>
<tr><td>Mall</td><td>Dining</td><td>5%</td><td>10</td><td>1</td><td>120</td></tr>
<tr><td>Mall</td><td>Concourse</td><td>20%</td><td>20</td><td>1</td><td>30</td></tr>
<tr><td>Mall</td><td>Food Prep</td><td>5%</td><td>20</td><td>10</td><td>120</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mall</td><td>Average</td><td>100%</td><td>32.5</td><td>2.05</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Big Box</td><td>Retail</td><td>100%</td><td>30</td><td>2.5</td><td>40</td></tr>
</table></td></tr>
<tr><td>Operating Schedules</td><td colspan="3">NECB Schedule C 2017 throughout.</td></tr>
<tr><td>Temperature Setpoints</td><td colspan="3">22°C heating (when occupied)
24°C cooling (when occupied)
Night setbacks to 18°C heating, 30°C cooling.</td></tr>
<tr><td>Interior Lighting</td><td colspan="3">Proposed model varies: 0%, 25%, and 50% LPD savings compared with NECB 2020

<table>
<tr><th>Building Type</th><th>Space Type</th><th>% of Area</th><th>NECB 2015 LPD (W/ m^2)</th><th>NECB 2020 LPD (W/ m^2)</th></tr>
<tr><td>Mall</td><td>Retail</td><td>40%</td><td>15.5</td><td>11.3</td></tr>
<tr><td>Mall</td><td>Warehouse</td><td>30%</td><td>10.2</td><td>7.4</td></tr>
<tr><td>Mall</td><td>Dining</td><td>5%</td><td>7</td><td>4.7</td></tr>
<tr><td>Mall</td><td>Concourse</td><td>20%</td><td>11.9</td><td>8.8</td></tr>
<tr><td>Mall</td><td>Food Prep</td><td>5%</td><td>13.1</td><td>11.7</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mall</td><td>Average</td><td>100%</td><td>12.65</td><td>9.32</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Big Box</td><td>Retail</td><td>100%</td><td>15.5</td><td>11.3</td></tr>
</table></td></tr>
<tr><td>Exterior Lighting</td><td colspan="3">None.</td></tr>
</table>

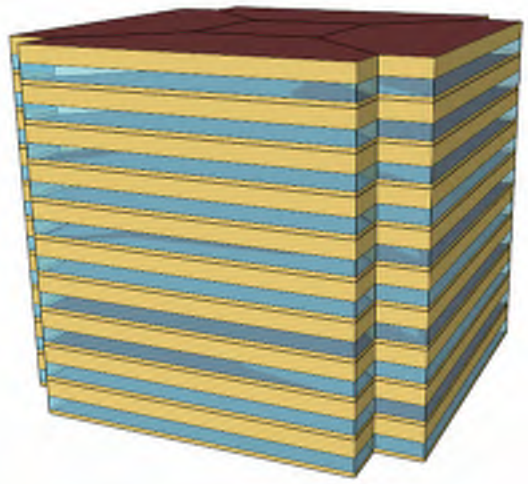
Retail			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Additional Loads	None. No elevator loads allowed for.		
Envelope			
Walls	Varies: R-4, 7, 10, 20, 40	De-rated by 40% to allow for thermal bridging. See discussion section. CZ4 – R-10.8 CZ5 – R-12.3 CZ6 – R-13.8 CZ7a – R-16.2	CZ4 – R-19.6 CZ5 – R-21.4 CZ6 – R-23.7 CZ7a – R-26.4
Roofs	Varies: R-20, 40, 60	CZ4 – R-25.0 CZ5 – R-31.0 CZ6 – R-31.0 CZ7a – R-35.7	CZ4 – R-34.6 CZ5 – R-36.4 CZ6 – R-41.1 CZ7a – R-46.9
Windows	Varies: USI-2.5, 2, 1.6, 1.2, 0.8 SHGC 0.4	CZ4 – USI-2.4 CZ5 – USI-2.2 CZ6 – USI-2.2 CZ7a – USI-2.2 SHGC 0.4 for all	CZ4 – USI-1.9 CZ5 – USI-1.9 CZ6 – USI-1.73 CZ7a – USI-1.73 SHGC 0.4 for all
Window-to-wall ratio	Varies: 5%, 20%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28%
Shading	None		
Soffit / exposed floor	None		
Parkade	None		

Retail			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Infiltration	Varies: 0.2 L/s/m^2, 0.1 L/s/m^2, 0.01 L/s/m^2 Of exterior wall area Constant flow (per CoV Modelling Guidelines v2)	0.2 L/s/m^2	0.2 L/s/m^2
Mechanical Systems			
Mech system description	Options: Unitary Gas RTU Natural gas heating coil, DX cooling coil. Fan operates as constant volume during occupied hours, and cycling overnight. Mixed air system with economizer. 4-pipe FC with DOAS with hydronic heat/cool.	Unitary Gas RTU Natural gas heating coil, DX cooling coil. Fan operates as constant volume during occupied hours, and cycling overnight. Mixed air system with economizer.	Unitary Gas RTU Natural gas heating coil, DX cooling coil. Fan operates as constant volume during occupied hours, and cycling overnight. Mixed air system with economizer.
Air terminal units	RTU: Constant volume operation, no zone reheat/cooling. FC: 0.5 W/cfm zone fans, cycling fans (ventilation done by DOAS direct to zones). Hydronic heating and cooling.	Constant volume operation, no zone reheat/cooling.	Constant volume operation, no zone reheat/cooling.
Heat recovery	Varies: None, 60%, 80%	CZ4: None CZ5-7a: 50% effective heat recovery throughout. (dependent on RTU configuration; equalizing between NECB 2015 and 2020 where ambiguity exists)	CZ4: None CZ5-7a: 50% effective heat recovery.

Retail			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Economizer	RTU: Differential dry bulb economizer. DOAS: None (100% OA, no boost)	Differential dry bulb economizer.	Differential dry bulb economizer.
Central air systems	RTU: Mixed air system. Sizing: 21C heating temp diff, 11C cooling temp diff Sizing factor: 1.3 in heating, 1.1 in cooling Fans: 1W/cfm FC with DOAS: Sizing DOAS for ventilation rate. Fans: 1 W/cfm (0.5 W/cfm supply, 0.5 W/cfm return). Night cycle zone fans only, 100% recirc. DOAS hydronically heated/cooled. DOAS temperature controlled using warmest reset between 12-22°C	Mixed air system. Sizing: 21C heating temp diff, 11C cooling temp diff Sizing factor: 1.3 in heating, 1.1 in cooling Fans: 640 Pa at 40% efficiency	Mixed air system. Sizing: 21C heating temp diff, 11C cooling temp diff Sizing factor: 1.3 in heating, 1.1 in cooling Fans: 640 Pa at 40% efficiency
Heating and Cooling Efficiency	RTU: Gas coil 81% DX cooling: COP 3.8 FC with DOAS: Chiller: COP 5.771 Heating options: Standard efficiency (86%) Condensing (95%) ASHP (annual heating COP 3.2 CZ4, 3.1 CZ5, 3.0 CZ6, 2.5 CZ7a, 2.2 CZ7b, 2.0 CZ8)	Gas coil 81% DX cooling: COP 3.28	Gas coil 81% DX cooling: COP 3.8

<table>
<tr><th colspan="4">Retail</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Outdoor air flow rates</td><td colspan="3">ASHRAE 62.1-2016
Using default ASHRAE 2016 occupant densities

<table>
<tr><th>Building Type</th><th>Space Type</th><th>% of Area</th><th>L/s/person</th><th>L/s/ m^2</th><th>Combined OA Rate L/s/ m^2</th></tr>
<tr><td>Mall</td><td>Retail</td><td>40%</td><td>3.8</td><td>0.6</td><td>1.17</td></tr>
<tr><td>Mall</td><td>Warehouse</td><td>30%</td><td>5</td><td>0.3</td><td>1.05</td></tr>
<tr><td>Mall</td><td>Dining</td><td>5%</td><td>3.8</td><td>0.9</td><td>4.7</td></tr>
<tr><td>Mall</td><td>Concourse</td><td>20%</td><td>3.8</td><td>0.3</td><td>1.82</td></tr>
<tr><td>Mall</td><td>Food Prep</td><td>5%</td><td>3.8</td><td>0.6</td><td>1.36</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mall</td><td>Average</td><td>100%</td><td></td><td></td><td>1.45</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Big Box</td><td>Retail</td><td>100%</td><td>3.8</td><td>0.6</td><td>1.17</td></tr>
</table></td></tr>
<tr><td colspan="4">DHW</td></tr>
<tr><td>DHW Load</td><td>20% savings (low flow fixtures)
40% savings (low flow fixtures + drain water heat recovery)</td><td colspan="2">No savings (see internal loads)</td></tr>
<tr><td>DHW Heating Equipment</td><td>Nat gas: 95%
Elec resistance</td><td>Nat gas: 80%
Elec resistance</td><td>Nat gas: 95%
Elec resistance</td></tr>
</table>

<table>
<tr><th colspan="4">Hotel</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Climate Zone</td><td colspan="3">Climate Zone 4, 5, 6, 7a, 7b, 8</td></tr>
<tr><td>Weather File</td><td colspan="3">Vancouver Airport CWEC 2016, Kamloops AP CWEC 2016, Prince George Intl AP CWEC 2016, Fort St. John – North Peace Rgnl AP CWEC 2016, Fort Nelson – Northern Rockies Rgnl AP CWEC 2016, Yellowknife AP CWEC 2016</td></tr>
<tr><td>Software</td><td colspan="3">EnergyPlus v9.4</td></tr>
<tr><td>Building Area</td><td colspan="3">9,521 m^2 conditioned area</td></tr>
<tr><td>Storeys</td><td colspan="3">10</td></tr>
<tr><td>Building Description (space types)</td><td colspan="3"><table><tr><td>Space Type</td><td>% of total area</td></tr><tr><td>Conference</td><td>6.7%</td></tr><tr><td>Corridor</td><td>8.4%</td></tr><tr><td>Fitness</td><td>1.1%</td></tr><tr><td>Kitchen</td><td>1.8%</td></tr><tr><td>Laundry</td><td>0.4%</td></tr><tr><td>Lobby</td><td>2.2%</td></tr><tr><td>Pool</td><td>1.1%</td></tr><tr><td>Storage</td><td>6.7%</td></tr><tr><td>Unit</td><td>71.6%</td></tr></table></td></tr>
<tr><td>Visual</td><td colspan="3">  </td></tr>
<tr><td>Zoning</td><td colspan="3">Suites on exterior, individual zones assigned for each space type (except kitchen/laundry combined due to high exhaust loads). Zone multipliers used for intermediate floors.</td></tr>
</table>

<table>
<tr><th colspan="4">Hotel</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td colspan="4">Internal Loads and Schedules</td></tr>
<tr><td>Internal Loads (NECB 2017 defaults)</td><td colspan="3">
<table>
<tr><th>Space Type</th><th>% of total area</th><th>NECB Schedule</th><th>Occupant Density (m^2/occ)</th><th>Plug (W/m^2)</th><th>SWH (W/occ)</th></tr>
<tr><td>Conference</td><td>6.7%</td><td>C</td><td>5</td><td>1</td><td>45</td></tr>
<tr><td>Corridor</td><td>8.4%</td><td>H</td><td>100</td><td>0</td><td>0</td></tr>
<tr><td>Fitness</td><td>1.1%</td><td>B</td><td>5</td><td>1</td><td>90</td></tr>
<tr><td>Kitchen</td><td>1.8%</td><td>B</td><td>20</td><td>10</td><td>120</td></tr>
<tr><td>Laundry</td><td>0.4%</td><td>B</td><td>20</td><td>20</td><td>60</td></tr>
<tr><td>Lobby</td><td>2.2%</td><td>H</td><td>10</td><td>2.5</td><td>30</td></tr>
<tr><td>Pool</td><td>1.1%</td><td>B</td><td>5</td><td>1</td><td>90</td></tr>
<tr><td>Storage</td><td>6.7%</td><td>E</td><td>100</td><td>1</td><td>300</td></tr>
<tr><td>Unit</td><td>71.6%</td><td>F</td><td>25</td><td>2.5</td><td>600</td></tr>
</table>
Note that NECB 2017 was the most recent fully available version of NECB at the time of modelling and these loads are used throughout. See Section 2.1.1 for more information.
</td></tr>
<tr><td>Operating Schedules</td><td colspan="3">NECB 2017 Schedules B, C, E, F and H.
See table above for breakdown by space type.</td></tr>
<tr><td>Temperature Setpoints</td><td colspan="3">22°C heating (daytime/occupied)
24°C cooling (daytime/occupied)
Night setbacks to 18°C heating, 30°C cooling.
Pool: 28°C
Parkade unconditioned (exhaust fans only)</td></tr>
<tr><td>Interior Lighting</td><td colspan="3">Proposed lighting savings: 0%, 20%, 40%
<table>
<tr><th>Space Type</th><th>LPD NECB 2015 (W/ m^2)</th><th>LPD NECB 2020 (W/ m^2)</th></tr>
<tr><td>Suites</td><td>5.1</td><td>4.4</td></tr>
<tr><td>Lobby</td><td>11.5</td><td>5.4</td></tr>
<tr><td>Conference</td><td>13.3</td><td>10.5</td></tr>
<tr><td>Fitness, Pool</td><td>7.8</td><td>9.6</td></tr>
<tr><td>Storage</td><td>6.8</td><td>4.1</td></tr>
<tr><td>Kitchen</td><td>13.1</td><td>11.7</td></tr>
<tr><td>Laundry</td><td>6.5</td><td>5.7</td></tr>
<tr><td>Corridors</td><td>7.1</td><td>4.4</td></tr>
<tr><td>Parking</td><td>2.1</td><td>1.5</td></tr>
</table>
</td></tr>
<tr><td>Exterior Lighting</td><td colspan="3">2 kW allowance, controlled by photocell</td></tr>
</table>

Hotel			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Additional Loads	Elevators 3 kW / elevator x 2 elevators Per CoV Modelling Guidelines v2 Laundry: 29,752W allowance (electric and natural gas options modeled) Pool: Heating: 6078 W (always on) Latent load: 1607 W (always on) Pumping: 10W (always on)		
Envelope			
Walls	Varies: R-5, 10, 15, 20, 30	De-rated by 40% to allow for thermal bridging. See discussion section. CZ4 – R-10.8 CZ5 – R-12.3 CZ6 – R-13.8 CZ7a – R-16.2 CZ7b – R-16.2 CZ8 – R-18.6	CZ4 – R-19.6 CZ5 – R-21.4 CZ6 – R-23.7 CZ7a – R-26.4 CZ7b – R-29.9 CZ8 – R-34.4
Roofs	Varies: R-20, 40	CZ4 – R-25.0 CZ5 – R-31.0 CZ6 – R-31.0 CZ7a – R-35.1 CZ7b – R-35.1 CZ8 – R-40.0	CZ4 – R-34.6 CZ5 – R-36.4 CZ6 – R-41.1 CZ7a – R-46.9 CZ7b – 48.5 CZ8 – 51.6
Windows	Varies: USI-2.5, 2, 1.6, 1.2, 0.8 SHGC Varies: 0.3, 0.4	CZ4 – USI-2.4 CZ5 – USI-2.2 CZ6 – USI-2.2 CZ7a – USI-2.2 CZ7b – USI-2.2 CZ8 – USI-1.6 SHGC 0.3 for all	CZ4 – USI-1.9 CZ5 – USI-1.9 CZ6 – USI-1.73 CZ7a – USI-1.73 CZ7b – USI-1.44 CZ8 – USI-1.44 SHGC 0.3 for all
Window-to-wall ratio	Varies: 20%, 50%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28% CZ7b – 22% CZ8 – 20%	CZ4 – 40% CZ5 – 40% CZ6 – 35% CZ7a – 28% CZ7b – 22% CZ8 – 20%

Hotel			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Shading	None		
Soffit / exposed floor	None		
Parkade	No heat transfer between parkade ceiling and lowest floor (idealized to allow for changes in parkade area with unit density)		
Infiltration	Varies: 0.2 L/s/m^2, 0.1 L/s/m^2, 0.01 L/s/m^2 Of exterior wall area Constant flow (per CoV Modelling Guidelines v2)	0.2 L/s/m^2	0.2 L/s/m^2
Mechanical Systems			
Mech system description	All: Units: ERVs with FCs Pool: unitary (gas/DX) Kitchen, laundry: MUA (gas/DX) Options: VAV mixed air system with hydronic heating and cooling, zone reheat (with warmest reset). Or: 4-pipe FC with DOAS (hydronic heat/cool)	Units: ERVs with FCs Pool: unitary (gas/DX) Kitchen, laundry: MUA (gas/DX) Conference, lobby, storage: RTU (gas/DX)	

Hotel			
	Proposed Design	**NECB 2015 Baseline (BCBC 2018)**	**NECB 2020 Baseline**
Air terminal units	Units: ERVs with electric preheat to -5C, with temperature control (not floating). 1 W/cfm for fans. 4-pipe FCs, fans cycling, 0.3 W/cfm fans. Hydronic heating and cooling. VAV: 30% constant minimum or min OA rate, whichever is higher. Zone reheat provided by hydronic coils. OA control stays at constant min flow rate rather than proportional (OA may be higher % of total flow when total system flow is low) FC: 4-pipe FCs, fans cycling, 0.3 W/cfm fans. Hydronic heating and cooling.	Units: Same as proposed. RTUs, unitary pool system, and kitchen/laundry MUA all have constant flow. Zone level hydronic heating.	Units: Same as proposed. RTUs, unitary pool system, and kitchen/laundry MUA all have constant flow. Zone level hydronic heating.
Heat recovery	Varies: None, 60%, 90%	Using residential heat recovery criteria. CZ4-6: none CZ7a-8: 65% effective in units.	Using residential heat recovery criteria. CZ4-6: none CZ7a-8: 65% effective in units.
Economizer	Differential drybulb economizer. No economizer for DOAS (100% OA, no boost.)	Differential drybulb economizer	Differential drybulb economizer
Central air systems	All central fans 1 W/cfm (DOAS, VAV, RTUs) Sizing: 21C heating temp diff, 11C cooling temp diff Sizing factor: 1.3 in heating, 1.1 in cooling Warmest reset for all systems.	Sizing: 21C heating temp diff, 11C cooling temp diff Sizing factor: 1.3 in heating, 1.1 in cooling Fans: all fans 640 Pa at 40% efficiency Baseboards/FCs provide conditioning if fans are off.	

<table>
<tr><th colspan="5">Hotel</th></tr>
<tr><th></th><th>Proposed Design</th><th>NECB 2015 Baseline (BCBC 2018)</th><th>NECB 2020 Baseline</th></tr>
<tr><td>Heating and Cooling Efficiency</td><td>Heating options:
Standard efficiency (86%)
Condensing (95%)
ASHP (annual heating COP 3.2 CZ4, 3.1 CZ5, 3.0 CZ6, 2.5 CZ7a, 2.2 CZ7b, 2.0 CZ8)

Chiller: COP 6.2</td><td>Boiler 83% Et
Chiller COP 2.802</td><td>Boiler 90% Et
Chiller COP 5.771</td></tr>
<tr><td>Outdoor air flow rates</td><td colspan="3">ASHRAE 62.1-2016 rates, using default ASHRAE 62.1 occupant densities
<table>
<tr><th>Space Type</th><th>People/ 100m^2</th><th>L/s/person</th><th>L/s/ m^2</th><th>Combined OA Rate (L/s/m^2)</th></tr>
<tr><td>Conference</td><td>50</td><td>2.5</td><td>0.3</td><td>1.55</td></tr>
<tr><td>Corridor</td><td></td><td></td><td>0.3</td><td>0.3</td></tr>
<tr><td>Fitness</td><td>10</td><td>10</td><td>0.3</td><td>1.3</td></tr>
<tr><td>Kitchen</td><td>20</td><td>3.8</td><td>0.6</td><td>1.36</td></tr>
<tr><td>Laundry</td><td>10</td><td>2.5</td><td>0.6</td><td>0.85</td></tr>
<tr><td>Lobby</td><td>30</td><td>3.8</td><td>0.3</td><td>1.44</td></tr>
<tr><td>Pool</td><td></td><td></td><td>2.4</td><td>2.4</td></tr>
<tr><td>Storage</td><td>2</td><td>2.5</td><td>0.6</td><td>0.65</td></tr>
<tr><td>Unit</td><td>10</td><td>2.5</td><td>0.3</td><td>0.55</td></tr>
</table></td></tr>
<tr><td>Parkade</td><td>Exhaust fan allowance 25,842 W
Parkade lighting 13.2 kW</td><td>Exhaust fan allowance 25,842 W
Parkade lighting 18.48 kW</td><td>Exhaust fan allowance 25,842 W
Parkade lighting 13.2 kW</td></tr>
<tr><td colspan="4">DHW</td></tr>
<tr><td>DHW Load</td><td>20% savings (low flow fixtures)
40% savings (low flow fixtures + drain water heat recovery)</td><td colspan="2">No savings (see internal loads)</td></tr>
<tr><td>DHW Heating Equipment</td><td>Nat gas: 95%
Elec resistance</td><td>Nat gas: 80%
Elec resistance</td><td>Nat gas: 90%
Elec resistance</td></tr>
</table>

Part 9 Energy Modelling Base Case Inputs

	Laneway House	Small House	Medium SFD- Full Basement	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher SAR	Medium SFD- Full Basement- Higher SAR	Large SFD- Full Basement	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher SAR	Large SFD- Full Basement- Higher SAR	Quadplex	Rowhouse- 6 units	MURB- 10 units
	New- Market WWR and SAR	2018 BSSB	2018 BSSB WWR and SAR	18% WWR	23% WWR	increase SAR by 25% , keep WWR same	increase SAR by 50% , keep WWR same	2018 BSSB WWR and SAR	18% WWR	23% WWR	increase SAR by 25% , keep WWR same	increase SAR by 50% , keep WWR same	Modified 2018 version- now slab on grade	2018 BSSB WWR and SAR	2018 BSSB WWR and SAR
Construction Parameters:													Units A2/A1/B1/B2	Units J/K/K/L/K/J	10 units
Basic Description	2 storeys on slab	1 storeys on crawlspace	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	2 storeys on full basement	3 storeys, on slab on grade	3 storeys on slab-on-grade	3 storeys on parkade suspended slab, basement entry
Total floor area (sq ft)	750	1100	2550	2550	2550	2550	2550	5500	5500	5500	5500	5500	4848	10930	17810
Total floor area (sq m)	70	102	237	237	237	237	237	511	511	511	511	511	451	1016	1655
Floor heights, bottom to top (ft)	8/8	3/8 (3 is crawlspace ceiling height)	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	8/8/8	9/9/9/9
Window Area (sq ft)	225	144	333	420	560	840	1120	718	980	1260			825	1866	2523
Gross wall area, incl headers and above grade foundation walls (sq ft)	1427	1496	2432	2432	2432	3650	4850	5452	5452	5452	6815	8178	4719	8382	9858
Window to gross wall ratio	0.16	0.10	0.137	0.173	0.230	0.230	0.231	0.13	0.18	0.23	0.00	0.00	0.17	0.22	0.26
Total Envelope Area (sq ft)	2178	4002	4866	4866	4866	6084	7284	10444	10444	10444			8044	16926	21377
Interior Volume (cu ft)	6375	13200	21058	21058	21058	21058	21058	45420	45420	45420	45420	45420	42770	93296	172270
Surface to volume ratio (SVR)	0.34	0.30	0.23	0.23	0.23	0.29	0.35	0.23	0.23	0.23	0.00	0.00	0.19	0.18	0.12
Surface to floor area ratio (SAR)	2.90	3.64	1.91	1.91	1.91	2.39	2.86	1.90	1.90	1.90	0.00	0.00	1.66	1.55	1.20
Space heating (description and efficiency)	Electric baseboard heaters	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	NG forced air furnace, 95% AFUE with ECM	Electric baseboard heaters	NG forced air furnace, 95% AFUE with ECM	Electric baseboard heaters
Space cooling (description and efficiency)	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
Domestic hot water heating (description and efficiency)	natural gas tankless, 0.92 EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	NG storage tank, 40 gallon, 0.67EF	natural gas tankless, 0.92 EF	NG storage tank, 40 gallon, 0.67EF	natural gas tankless, 0.92 EF
Ventilation system (description and efficiency)	Exhaust fan without heat recovery, intake fan for supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, furnace supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, intake fan for supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, air handler supply air, BCBC Section 9.32 ventilation rate	Exhaust fan without heat recovery, intake fan for supply air, BCBC Section 9.32 ventilation rate
Ventilation rate (continuous) as per BCBC 9.36 (cfm)	44	44	75	75	75	75	75	103	103	103	103	103	176	354	440
Airtightness (ACH@50Pa)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

	Laneway House	Small House	Medium SFD- Full Basement	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher SAR	Medium SFD- Full Basement- Higher SAR	Large SFD- Full Basement	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher SAR	Large SFD- Full Basement- Higher SAR	Quadplex	Rowhouse- 6 units	MURB- 10 units
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Attic insulation	CZ4: Effective R39.2 (trusses @24"OC with R40 blown insulation) CZ5: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ6: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ7A: Effective R59.2 (trusses @24"OC with R60 blown insulation)CZ4: CZ7B: Effective R59.2 (trusses @24"OC with R60 blown insulation) CZ8: Effective R59.2 (trusses @24"OC with R60 blown insulation)	CZ4: Effective R39.2 (trusses @24"OC with R40 blown insulation) CZ5: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ6: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ7A: Effective R59.2 (trusses @24"OC with R60 blown insulation)CZ4: CZ7B: Effective R59.2 (trusses @24"OC with R60 blown insulation) CZ8: Effective R59.2 (trusses @24"OC with R60 blown insulation)	CZ4: Effective R39.2 (trusses @24"OC with R40 blown insulation) CZ5: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ6: Effective R49.2 (trusses @24"OC with R50 blown insulation) CZ7A: 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Flat Ceiling Insulation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CZ4/CZ5/CZ6: Effective R26.5 (2x12@16"OC with R30 batt) CZ7A/CZ7B/CZ8 : Effective R28.5 (2x12@16"OC with R32 batt)	N/A	N/A
Wall insulation	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective	CZ4: Effective R15.8 (2x6@16" with R20 batt) CZ5: Effective R17.5 (2x6@16" with R24 batt) CZ6: Effective R17.5 (2x6@16" with R24 batt) CZ7A: Effective R17.5 (2x6@16" with R24 batt) CZ7B: Effective R21.9 (2x8@24" with R28 batt) CZ8: Effective

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	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)	R21.9 (2x8@24" with R28 batt)
Floors over unheated space	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CZ4/CZ5/CZ6: Effective R26.5 (2x12@16"OC with R30 batt) CZ7A/CZ7B/CZ8: Effective R28.5 (2x12@16"OC with R32 batt)	CZ4/CZ5/CZ6: Effective R26.5 (2x12@16"OC with R30 batt) CZ7A/CZ7B/CZ8: Effective R28.5 (2x12@16"OC with R32 batt)	CZ4/CZ5/CZ6: Effective R26.5 (2x12@16"OC with R30 batt) CZ7A/CZ7B/CZ8: Effective R28.5 (2x12@16"OC with R32 batt)
Foundation wall insulation	N/A	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)	N/A	CZ4: Effective R11.3 (2x4@16" with R14 batt) CZ5: Effective R16.9 (2x6@16" with R20 batt) CZ6: Effective R16.9 (2x6@16" with R20 batt) CZ7A: Effective R19.6 (2x6@16" with R24 batt) CZ7B: Effective R19.6 (2x6@16" with R24 batt) CZ8: Effective R22.5 (2x6@24" with R24 batt)
Floor slab insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation	CZ4/CZ5/CZ6/CZ7A/CZ7B/CZ8: Above Frost Line: Effective R11.2 (R10 under slab for 4ft width and R10 at slab edge) Below Frost Line: no insulation

	Laneway House	Small House	Medium SFD- Full Basement	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher WWR	Medium SFD- Full Basement- Higher SAR	Medium SFD- Full Basement- Higher SAR	Large SFD- Full Basement	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher WWR	Large SFD- Full Basement- Higher SAR	Large SFD- Full Basement- Higher SAR	Quadplex	Rowhouse- 6 units	MURB- 10 units
	New- Market WWR and SAR	2018 BSSB	2018 BSSB WWR and SAR	18% WWR	23% WWR	increase SAR by 25% , keep WWR same	increase SAR by 50% , keep WWR same	2018 BSSB WWR and SAR	18% WWR	23% WWR	increase SAR by 25% , keep WWR same	increase SAR by 50% , keep WWR same	Modified 2018 version- now slab on grade	2018 BSSB WWR and SAR	2018 BSSB WWR and SAR
Windows (description and efficiency)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)	CZ4/CZ5: USI 1.80 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ6/CZ7A: USI 1.60 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas) CZ7B/CZ8: USI 1.40 and SHGC 0.25 (double pane, vinyl frame with low-e & argon gas)
Window orientation	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South	As per BSSB version of Archetype; otherwise with most glazing facing South
Doors	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)	USI 1.40 (metal skin, insulated)
Occupants	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	2 Adults, 1 Child	8 Adults, 4 Child	9 Adults, 9 Child	20 Adults, 0 Child

Higher SAR Calculations:

	Volume (cu ft)	Ceiling Area (sq ft)	Floor Area (sq ft)	Floor Heights (ft)	Window Area (sq ft)	Gross Wall Area (sq ft)	WWR	Total Envelope Area (sq ft)	SAR (Total Envelope to Floor Area ratio)	Increase in SAR
Med SFD	21058	848	2550	8/8/8	333	2432	0.137	4866	1.91	0%
Med SFD with SAR increased by 25%	21058	848	2550	8/8/8	500	3650	0.137	6084	2.39	25.0%
Med SFD with SAR increased by 50%	21058	848	2550	8/8/8	665	4865	0.137	7299	2.86	50.0%

	Volume (cu ft)	Ceiling Area (sq ft)	Floor Area (sq ft)	Floor Heights (ft)	Window Area (sq ft)	Gross Wall Area (sq ft)	WWR	Total Envelope Area (sq ft)	SAR (Total Envelope to Floor Area ratio)	Increase in SAR
Large SFD	45420		5500	8/8/8	718	5452	0.132	10444	1.90	0%
Large SFD with SAR increased by 25%	45420		5500	8/8/8	1065	8065	0.132	13057	2.37	25.0%
Large SFD with SAR increased by 50%	45420		5500	8/8/8	1410	10675	0.132	15667	2.85	50.0%

Appendix B: Detailed Cost Analysis Inputs

Table B1. ECM Costs for Part 3 Buildings

ECM: Walls

	Effective R - Proposed							
	4	5	7	10	15	20	30	40
Low Rise MURB	Wood frame w/batt	N/A	Wood frame w/batt	Wood frame w/batt	N/A	Wood frame w/batt and 2-4" ext ins	N/A	Wood frame w/batt and 6" ext ins
High Rise MURB (all w/balconies)	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud 6-8" (point support balconies)	N/A	Theoretical assembly; not achievable with balconies
Office	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud 6-8"	N/A	Ext Ins Steel Stud 10-12"
Retail	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud 4-6"	N/A	Ext Ins Steel Stud 10-12"
Hotel	N/A	Ext Ins Steel Stud	N/A	Ext Ins Steel Stud	Ext Ins Steel Stud 4-6"	Ext Ins Steel Stud 6-8"	Ext Ins Steel Stud 10-12"	N/A

Costs:	Total ($/ft2)	Incremental $/m²
Wood frame w/batt		0
Wood frame w/batt and 2-4" ext ins		50
Wood frame w/batt and 6" ext ins		150
Ext Ins Steel Stud	75	
Ext Ins Steel Stud 4-6"	80	
Ext Ins Steel Stud 6-8"	90	
Ext Ins Steel Stud 6-8" (point support balconies)	120	
Ext Ins Steel Stud 10-12"	120	

Sources: Wood frame premium 2018 Metrics Report, Steel frame costs from consultants and suppliers, and checked against 2018 report

Roof

$5/inch (R-5) of additional insulation beyond NECB 2015 minimum, plus 2% inflation per year over 3 years
e.g. $23.3/m2 premium for R-20 additional insulation beyond NECB 2015 minimum
Source: 2018 Metrics Report, plus inflation

Windows

Window USI	Description	Cost ($/m² of window area)
Varies	NECB 2015	Varies
Varies	NECB 2020	Varies
2.5	Double glazed aluminum, low-e	970
2	Double glazed aluminum, low-e	1020

	1.6	Higher performance window wall double glazed aluminum, low-e	1130
	1.2	Curtain wall double glazed aluminum, low-e	1290
	0.8	Passive house style. 20% allowance added for structural.	1660

Baseline window performance:

CZ	NECB 2015 USI	NECB 2020 USI	NECB 2015 $/m²	NECB 2020 $/m²	Baseline WWR
4	2.4	1.9	970	1020	0.40
5	2.2	1.9	970	1020	0.40
6	2.2	1.73	970	1130	0.35
7a	2.2	1.73	970	1130	0.28
7b	2.2	1.44	970	1290	0.22
8	1.6	1.44	1130	1290	0.20

Solar heat gain coefficient is assigned no cost premium, as the baseline would be adjusted to match the proposed SHGC. The difference between different low-e coatings is anticipated to be approximately $8/m² ($0.75/ft²) at a maximum, which would have a very small impact on overall cost premiums. Source: Local window supplier and passive house window supplier, checked against consultants and 2018 Metrics Report. For passive house style glazing/triple glazing, added a 20% allowance for structural improvements.

Window to wall ratio

Window and wall incremental costs are calculated against the NECB 2015 baseline window to wall ratio by climate zone.
This may lead to an increase or savings in costs; and would cause cost differentials between climate zones beyond the climate zone multiplier noted below. For instance, for a proposed scenario with 40% glazing using standard double glazing in climate zone 4, there may be no premium or a very small premium. For the same amount and type of glazing in climate zone 8, the proposed scenario is compared with a baseline of 20% WWR, and the additional glazing area would come at a cost. However, this cost would be offset by a decrease in required wall area compared with the baseline, and the overall incremental capital cost of the scenario would depend on the cost of the specified wall performance compared with the baseline, as well as the window performance and area.

Air tightness

Infiltration	Description	Cost
0.2	Code	30,000
0.1	Half of code; add an interim test + trades training.	55,000
0.01	Passive house (approximately); add extra interim test.	75,000

	Source: local airtightness testing firm, local envelope consultant, checked against 2018 report.	
Lighting savings	No cost premium included for lower lighting power density. All baselines represent LED and include occupancy sensor and daylighting control where required. There continue to be improvements in LED technology to reduce LPDs.	
HVAC System Type	No cost premium included for HVAC system type, because the switch between, for example, baseboard to fan coil in MURBs is not an ECM, rather it is a program variation. It is not driven by energy, but by space or maintenance requirements, addition of cooling, or owner requirements.	
Heating	Standard Boiler: 25% savings vs condensing. $64/kW equivalent capacity Condensing Boiler: $25/MBH. $85/kW equivalent capacity ASHP: 2-pipe, $2750/ton. $357/kW equivalent capacity Capacity based on per floor area rule of thumb rather than model to be conservative and allow for adequate safety factor etc., using 50 btu/hr/sf. Actual savings likely available for higher performing envelope scenarios. Source: local contractor (for system fully installed), checked against RSMeans.	
HRV	Residential (individual unit per suite) None: $0/suite 60-65%: $1600/suite 80%: $4300/suite If the NECB 2015 baseline includes HRVs, there is a cost savings calculated if the proposed scenario has no HRVs, and a smaller cost premium for high-efficiency HRVs. Source: local contractor, HRV supplier, RSMeans	Commercial (large central unit(s)) None: $0/cfm 50-60%: $12/cfm 80%-90%: $24/cfm If the NECB 2015 baseline includes HRVs, there is a cost savings calculated if the proposed scenario has no HRVs, and a smaller cost premium for high-efficiency HRVs. Source: local contractor, RSMeans
Drain-water Recovery	20%: low flow fixtures, no cost premium 40%: low flow fixtures + drainwater heat recovery, $3.71 /$m^2$ of floor area Source: 2018 Metrics Report, plus inflation	

Table B2. Passive Cooling Measures

Passive Cooling Measure	Cost
Night Pre-cool	No cost, controls measure
HRV Bypass	Allowed for double the unit equipment cost, at same labour rate, based on RSMeans data, at $0.7/cfm. Added 0.1$m^2$ (1ft^2) of extra floor area per suite (3201$/$m^2$ ($297.5/sf) base construction cost, average 10 suites/floor). Total additional equipment cost 0$.51/ m^2, additional space allowance $4.6/ m^2.
HRV Boost	20% boost. Allowed for 20% additional cost including labour based on smallest HRV units in RSMeans, plus one extra ft2 per unit as was done

	with HRV bypass. Bypass equipment premium allowance $0.31/m^2, bypass extra space allowance $4.6/m^2.
Overhang	$ 2657 / linear meter ($810.15 / linear foot) per RSMeans Length uses 70% of perimeter of building (some length anticipated to not have window). Reduced by half if WWR is 20%. Total premium $291/m^2 of building area, $146/m^2 for 20% WWR case.
Fin	Uses same per linear meter cost as overhang. Fin length uses 1.5m length from top to bottom of fin, and average of 6 fins per façade = 24 fins/building Total premium $149/ m^2 of building area, $74/ m^2 for 20% WWR case.
Exterior Shade	Several sources and options considered and average of values was used (many options for manual vs controlled, different mounting options, etc.) Insulative shade (RSMeans): $229.73/ m^2 Interior insulated shutter (RSMeans): $80.05/ m^2 Consumer roller shade, exterior motorized, equipment only but without any bulk purchase deal: $107.6/ m^2 Using $139/ m^2 of window area Total premium $17 - 50/ m^2 of building area (varies based on WWR)

Table B3. Building Base Costs

Altus Construction Guide provides a range of costs for each building type. The mid-point of the range is used.

MURB	Vancouver - mid point for 7-39 storeys	3201 $/m^2 (297.5 $/ft^2)
Office	Vancouver - mid point for 5 - 30 storeys, average of Class A and B	3120 $/m^2 (290 $/ft^2)
Retail	Big box – Vancouver mid-point Mall - Vancouver mid-point	2260 $/m^2 (210 $/ft^2) 3416 $/m^2 (317.5 $/ft^2)
Hotel	Vancouver - mid from Budget to 4 Star	3282 $/m^2 (305 $/ft^2)

Source: 2021 Altus Construction Guide

Table B4. Climate Zone Multiplier

Multiplier on all costs to account for regional variations.

4	1
5	0.95
6	1.15
7a	1.15
7b	1.502
8	1.502

Source: 2018 Metrics Report

Table B.5 Part 9 Base Construction Costs

The detailed breakdown of individual ECM costs is available for each archetype within the Appendix C tables.

	Archetype:	Climate Zone (HDD)	Area (m2)	CZ Cost Multiplier	Base Construction Cost ($/m2) no adjustments	Base Construction Cost ($)
1	Laneway House	4 (Vancouver 2825 HDD)	69.7	1.000	2,851	198,750
		5 (Summerland 3350 HDD)	69.7	1.073	2,851	213,259
		6 (Cranbrook 4400 HDD)	69.7	1.126	2,851	223,793
		7A (Fort St. John 5750 HDD)	69.7	1.502	2,851	298,523
		7B (Fort Nelson 6710 HDD)	69.7	1.502	2,851	298,523
		8 (Uranium City 7500 HDD)	69.7	1.502	2,851	298,523
2	Small House	4 (Vancouver 2825 HDD)	102.2	1.000	2,206	225,500
		5 (Summerland 3350 HDD)	102.2	1.073	2,206	241,962
		6 (Cranbrook 4400 HDD)	102.2	1.126	2,206	253,913
		7A (Fort St. John 5750 HDD)	102.2	1.502	2,206	338,701
		7B (Fort Nelson 6710 HDD)	102.2	1.502	2,206	338,701
		8 (Uranium City 7500 HDD)	102.2	1.502	2,206	338,701
3	Medium House	4 (Vancouver 2825 HDD)	237.0	1.000	2,206	522,750
		5 (Summerland 3350 HDD)	237.0	1.073	2,206	560,911
		6 (Cranbrook 4400 HDD)	237.0	1.126	2,206	588,617
		7A (Fort St. John 5750 HDD)	237.0	1.502	2,206	785,171
		7B (Fort Nelson 6710 HDD)	237.0	1.502	2,206	785,171
		8 (Uranium City 7500 HDD)	237.0	1.502	2,206	785,171
8	Large House	4 (Vancouver 2825 HDD)	511.2	1.000	2,206	1,127,500
		5 (Summerland 3350 HDD)	511.2	1.073	2,206	1,209,808
		6 (Cranbrook 4400 HDD)	511.2	1.126	2,206	1,269,565
		7A (Fort St. John 5750 HDD)	511.2	1.502	2,206	1,693,505
		7B (Fort Nelson 6710 HDD)	511.2	1.502	2,206	1,693,505
		8 (Uranium City 7500 HDD)	511.2	1.502	2,206	1,693,505
13	Quadplex	4 (Vancouver 2825 HDD)	450.6	1.000	2,179	981,720
		5 (Summerland 3350 HDD)	450.6	1.073	2,179	1,053,386
		6 (Cranbrook 4400 HDD)	450.6	1.126	2,179	1,105,417
		7A (Fort St. John 5750 HDD)	450.6	1.502	2,179	1,474,543
		7B (Fort Nelson 6710 HDD)	450.6	1.502	2,179	1,474,543
		8 (Uranium City 7500 HDD)	450.6	1.502	2,179	1,474,543
14	Rowhouse - 6 units	4 (Vancouver 2825 HDD)	1,015.8	1.000	2,179	2,213,325
		5 (Summerland 3350 HDD)	1,015.8	1.073	2,179	2,374,898
		6 (Cranbrook 4400 HDD)	1,015.8	1.126	2,179	2,492,204
		7A (Fort St. John 5750 HDD)	1,015.8	1.502	2,179	3,324,414

	Archetype:	Climate Zone (HDD)	Area (m2)	CZ Cost Multiplier	Base Construction Cost ($/m2) no adjustments	Base Construction Cost ($)
		7B (Fort Nelson 6710 HDD)	1,015.8	1.502	2,179	3,324,414
		8 (Uranium City 7500 HDD)	1,015.8	1.502	2,179	3,324,414
15	MURB - 10 units	4 (Vancouver 2825 HDD)	1,655.2	1.000	2,529	4,185,350
		5 (Summerland 3350 HDD)	1,655.2	1.073	2,529	4,490,881
		6 (Cranbrook 4400 HDD)	1,655.2	1.126	2,529	4,712,704
		7A (Fort St. John 5750 HDD)	1,655.2	1.502	2,529	6,286,396
		7B (Fort Nelson 6710 HDD)	1,655.2	1.502	2,529	6,286,396
		8 (Uranium City 7500 HDD)	1,655.2	1.502	2,529	6,286,396

Data Source: 2021 Altus Construction Guide

Appendix C: Detailed Modelling Output Tables

*Note that Part 9 results tables have incorrectly formatted percentages – where % better than ERS or % better than envelope read in the thousands, this should be divided by 100 to view the actual percentage (e.g. 5000% should be read as 50%). This was due to an error in converting from program outputs to excel formatted values for final presentation only and does not impact outcomes.

High-Rise MURB - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	Elec	139.9	64	1.5	27708.2	0	139.9	631.8	-13.1	-0.4	-2.1	17.9	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	Elec	138.6	62.2	1.5	27436.1	0	138.6	638.2	-13.1	-0.4	-2.1	21.4	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	Elec	133.4	57.5	1.5	26413.9	0	133.4	578.6	-13.1	-0.4	-2.1	34.8	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	Elec	132	55.7	1.5	26141.5	0	132	589.6	-13.1	-0.4	-2.1	38	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	133.5	55.7	6.5	116956.9	28.9	104.6	589.6	-13.1	-0.4	-11	49.6	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	134.8	57.5	6.5	117229.2	28.9	105.9	578.6	-13.1	-0.4	-11.1	47.3	1
7	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	139.6	61.7	6.6	118167.3	28.9	110.7	634.9	-12.3	-0.4	-10.9	38.3	1
7	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	141	63.6	6.6	118438.8	28.9	112	628.5	-12.3	-0.4	-11.1	35.9	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	140	62.2	6.6	118251.4	28.9	111.1	638.2	-13.1	-0.4	-11.7	38.4	1
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	141.4	64	6.6	118523.5	28.9	112.5	631.8	-13.1	-0.4	-11.8	36	1
10	20	2	0.4	0.1	20	0	BB	BB	20	Elec	121.6	45	1.3	24085.8	0	121.6	517.1	-5.3	-0.2	-0.8	48	2
10	20	2	0.4	0.1	20	0	BB	BB	40	Elec	114.8	45	1.3	22726.5	0	114.8	517.1	-1.5	0	-0.2	56.2	2
10	40	2	0.4	0.1	20	0	BB	BB	40	Elec	114.4	44.6	1.3	22643.3	0	114.4	513.9	-0.8	0	-0.1	56.1	2
10	40	2	0.4	0.1	20	0	BB	BB	20	Elec	121.2	44.6	1.3	24002.5	0	121.2	513.9	-4.5	-0.1	-0.7	48	2
10	40	2	0.4	0.1	20	0	BB	BB	40	NG	115.4	44.6	5	90754.8	21.7	93.8	513.9	-0.8	0	-0.3	64.9	2
10	20	2	0.4	0.1	20	0	BB	BB	40	NG	115.9	45	5	90838	21.7	94.2	517.1	-1.5	0	-0.6	64.9	2
10	20	2	0.4	0.1	20	0	BB	BB	20	NG	123.1	45	6.4	114901.1	28.9	94.2	517.1	-5.3	-0.2	-4	59.7	2
10	40	2	0.4	0.1	20	0	BB	BB	20	NG	122.7	44.6	6.4	114817.9	28.9	93.8	513.9	-4.5	-0.1	-3.4	59.7	2
10	20	1.6	0.3	0.1	20	0	BB	BB	20	NG	120.9	43.1	6.4	114464.3	28.9	92	489	7.7	0.2	5.8	50.6	2
10	20	1.6	0.4	0.1	20	0	BB	BB	20	NG	119.9	41.7	6.3	114272.7	28.9	91	494.8	7.7	0.2	5.7	52.3	2
10	20	2.5	0.4	0.1	20	60	BB	BB	20	Elec	104.9	27.7	1.2	20772.9	0	104.9	431	14.5	0.5	2.2	57.2	3
10	20	2.5	0.3	0.1	20	60	BB	BB	20	NG	106.8	28.7	6.2	111675.2	28.9	77.9	429.3	14.5	0.5	9.7	68.1	3
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	106.4	27.7	6.2	111588.2	28.9	77.5	431	14.5	0.5	9.7	68.9	3
10	40	2.5	0.4	0.1	20	60	BB	BB	20	Elec	104.5	27.4	1.1	20694.4	0	104.5	427.7	15.2	0.5	2.3	57.1	3
10	40	2.5	0.3	0.1	20	60	BB	BB	20	Elec	104.9	28.4	1.2	20780.2	0	104.9	426	15.2	0.5	2.3	56.3	3
10	20	2.5	0.4	0.1	20	60	FC	Condensing	20	Elec	117.2	29.7	4.9	88545.6	20.9	96.4	319.8	17.8	0.6	1.2	51.8	3
10	40	2.5	0.3	0.1	20	60	BB	BB	20	NG	106.4	28.4	6.2	111595.5	28.9	77.5	426	15.2	0.5	10.2	68	3
10	40	2.5	0.4	0.1	20	60	BB	BB	20	NG	106	27.4	6.2	111509.7	28.9	77.1	427.7	15.2	0.5	10.2	68.8	3
10	20	2.5	0.4	0.1	20	60	FC	Condensing	20	NG	118.7	29.7	10	179361	49.8	68.9	319.8	17.8	0.6	1.9	63.4	3
10	20	2.5	0.3	0.1	20	60	BB	BB	20	Elec	105.3	28.7	1.2	20859.8	0	105.3	429.3	14.5	0.5	2.2	56.4	3
10	20	1.2	0.3	0.1	20	80	BB	BB	20	NG	92.6	13.7	6	108866.5	28.9	63.7	325.7	97.4	3	59.3	9.7	4
10	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	85.4	13.7	4.7	84803.4	21.7	63.7	325.7	101.1	3.2	33.9	14.9	4
10	20	1.2	0.4	0.1	20	80	BB	BB	20	NG	92.9	13.3	6.1	108926	28.9	64	325.8	97.4	3	59.4	9.2	4
10	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	91.2	13.7	1	18051.1	0	91.2	325.7	97.4	3	14.6	-2	4
10	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	91.5	13.3	1	18110.6	0	91.5	325.8	97.4	3	14.6	-2.5	4
10	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	92.2	13.3	6	108793.4	28.9	63.3	322.3	98.1	3.1	59.6	9.5	4
10	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	90.8	13.3	1	17978.1	0	90.8	322.3	98.1	3.1	14.7	-2.1	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	91.1	13	1	18039.3	0	91.1	322.5	98.1	3.1	14.7	-2.7	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	92.5	13	6	108854.7	28.9	63.6	322.5	98.1	3.1	59.7	9	4
10	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	85.7	13.3	4.7	84862.9	21.7	64	325.8	101.1	3.2	34	14.4	4

High-Rise MURB - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	159.1	80.1	6.8	122039.2	28.9	130.2	885.7	-12	-0.4	-11.3	31.3	1
7	20	2.5	0.3	0.2	20	0	BB	BB	20	Elec	157.7	80.1	1.7	31223.8	0	157.7	885.7	-12	-0.4	-2	-2	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	Elec	156.4	78.3	1.7	30958.8	0	156.4	888.7	-12	-0.4	-2	1.4	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	Elec	148.8	70.9	1.6	29464.3	0	148.8	831.7	-12	-0.4	-1.9	20.9	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	Elec	150.1	72.8	1.7	29729.4	0	150.1	828.7	-12	-0.4	-1.9	17.5	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	150.2	70.9	6.7	120279.7	28.9	121.3	831.7	-12	-0.4	-10.3	46.6	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	151.6	72.8	6.7	120544.8	28.9	122.7	828.7	-12	-0.4	-10.4	44.3	1
7	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	157.3	77.8	6.8	121666.6	28.9	128.4	884.4	-11.2	-0.4	-10.4	33.8	1
7	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	158.6	79.6	6.8	121930.9	28.9	129.7	881.4	-11.2	-0.4	-10.5	31.5	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	157.8	78.3	6.8	121774.2	28.9	128.9	888.7	-12	-0.4	-11.1	33.6	1
10	20	2.5	0.3	0.1	20	60	BB	BB	20	Elec	118.3	40.4	1.3	23421.8	0	118.3	649.9	14.2	0.4	2.2	61.4	2
10	20	2.5	0.3	0.1	20	60	BB	BB	20	NG	119.7	40.4	6.3	114237.1	28.9	90.8	649.9	14.2	0.4	9.5	73.1	2
10	40	2.5	0.3	0.1	20	60	BB	BB	20	NG	119.2	39.9	6.3	114132.9	28.9	90.3	645.5	14.9	0.5	9.9	73.3	2
10	40	2.5	0.4	0.1	20	60	BB	BB	20	NG	118.7	38.7	6.3	114029.7	28.9	89.8	648.6	14.9	0.5	9.9	74.2	2
10	40	2.5	0.4	0.1	20	60	BB	BB	20	Elec	117.2	38.7	1.3	23214.4	0	117.2	648.6	14.9	0.5	2.3	62.5	2
10	40	2.5	0.3	0.1	20	60	BB	BB	20	Elec	117.8	39.9	1.3	23317.5	0	117.8	645.5	14.9	0.5	2.3	61.6	2
10	20	2.5	0.3	0.1	20	60	BB	BB	40	NG	112.5	40.4	5	90174.1	21.7	90.8	649.9	17.7	0.6	6.3	78.5	2
10	20	2.5	0.4	0.1	20	60	BB	BB	40	NG	112	39.2	5	90069.5	21.7	90.3	653	17.7	0.6	6.2	79.4	2
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	119.2	39.2	6.3	114132.6	28.9	90.3	653	14.2	0.4	9.4	74	2
10	20	2.5	0.4	0.1	20	60	BB	BB	20	Elec	117.8	39.2	1.3	23317.3	0	117.8	653	14.2	0.4	2.2	62.3	2
10	40	2	0.4	0.1	20	60	BB	BB	20	NG	114.9	34.9	6.3	113289.3	28.9	86	615.8	21.1	0.7	13.6	74.5	3
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	107.7	34.9	5	89226.3	21.7	86	615.8	24.6	0.8	8.5	79.9	3
10	40	2	0.4	0.1	20	60	BB	BB	40	Elec	106.6	34.9	1.2	21114.7	0	106.6	615.8	24.6	0.8	3.7	71.1	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	111.9	31.7	6.3	112687.1	28.9	83	588.6	33.3	1	21	67.5	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.2	32.6	6.3	112741.6	28.9	83.3	585.5	33.3	1	21.1	67	3
10	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	111.3	33.1	1.2	22029	0	111.3	589.9	32.6	1	4.9	55.2	3
10	40	2	0.4	0.1	20	60	BB	BB	20	Elec	113.5	34.9	1.2	22474	0	113.5	615.8	21.1	0.7	3.2	62.8	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	112.4	32.2	6.3	112788.2	28.9	83.5	593	32.6	1	20.7	67.3	3
10	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.7	33.1	6.3	112844.4	28.9	83.8	589.9	32.6	1	20.7	66.8	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	111	32.2	1.2	21972.8	0	111	593	32.6	1	4.9	55.6	3
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	101.2	22	1.1	20046.6	0	101.2	519.9	93.7	2.9	13.9	11.3	4
10	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	99	19.5	1.1	19602.7	0	99	495	132	4.1	19.5	-23.1	4
10	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	99.7	19.5	6.1	110269.9	28.9	70.8	487.4	132.7	4.1	77.2	-10.8	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	95.5	22	4.8	86798.9	21.7	73.8	519.9	97.2	3	32.2	28.4	4
10	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	100	19	6.1	110323.9	28.9	71.1	490.6	132.7	4.1	77.4	-11.3	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	102.7	22	6.2	110862	28.9	73.8	519.9	93.7	2.9	55.6	23	4
10	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	100.4	19.5	6.1	110418	28.9	71.5	495	132	4.1	77.2	-11.4	4
10	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	100.2	20	6.1	110365.9	28.9	71.3	491.8	132	4.1	77	-10.9	4
10	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	98.7	20	1.1	19550.6	0	98.7	491.8	132	4.1	19.5	-22.6	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	94.4	22	1	18687.4	0	94.4	519.9	97.2	3	14.3	19.7	4

High-Rise MURB - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.2	20	0	BB	BB	20	Elec	179.4	103.8	2	35522.4	0	179.4	1057.1	-10.5	-0.3	-1.7	7.9	1
10	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	178.2	100.7	7	125808.3	28.9	149.3	1056.5	-9.6	-0.3	-8.4	49.1	1
10	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	180.1	103.1	7	126194.8	28.9	151.2	1051	-9.6	-0.3	-8.5	44.1	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	Elec	177.4	101.4	2	35135.3	0	177.4	1062.7	-10.5	-0.3	-1.7	12.9	1
10	40	2.5	0.4	0.2	20	0	BB	BB	20	Elec	176.7	100.7	1.9	34992.9	0	176.7	1056.5	-9.6	-0.3	-1.5	13.9	1
10	40	2.5	0.3	0.2	20	0	BB	BB	20	Elec	178.7	103.1	2	35379.4	0	178.7	1051	-9.6	-0.3	-1.6	8.9	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	178.9	101.4	7	125950.6	28.9	150	1062.7	-10.5	-0.3	-9.2	48.2	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	180.8	103.8	7	126337.7	28.9	151.9	1057.1	-10.5	-0.3	-9.4	43.1	1
7	20	2.5	0.4	0.1	20	0	BB	BB	20	NG	179.1	101.5	7	125994.1	28.9	150.2	1064.3	-8.9	-0.3	-7.8	46	1
7	20	2.5	0.3	0.1	20	0	BB	BB	20	NG	180.9	103.7	7	126350.6	28.9	152	1058.7	-8.9	-0.3	-8	41.4	1
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	119.9	48.8	5.1	91629.3	21.7	98.2	794.6	48.7	1.5	16	102.4	2
10	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	125.6	48.8	1.4	24877	0	125.6	794.6	44.4	1.4	6.6	86.1	2
10	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	126.3	49.5	1.4	25013.7	0	126.3	800.7	43.5	1.4	6.5	85.8	2
10	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	119.5	49.5	1.3	23654.5	0	119.5	800.7	47.8	1.5	7	93.3	2
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	120.5	49.5	5.1	91766	21.7	98.9	800.7	47.8	1.5	15.7	102.1	2
10	40	1.6	0.4	0.1	20	60	BB	BB	40	Elec	118.8	48.8	1.3	23517.8	0	118.8	794.6	48.7	1.5	7.1	93.6	2
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	127.8	49.5	6.4	115829.1	28.9	98.9	800.7	43.5	1.4	25.6	97.4	2
10	20	1.2	0.3	0.1	20	60	BB	BB	20	NG	123.8	45.9	6.4	115048.3	28.9	94.9	761.4	65.8	2.1	37.8	82	2
10	20	1.2	0.4	0.1	20	60	BB	BB	20	NG	123.3	44.8	6.4	114935.6	28.9	94.4	766.9	65.8	2.1	37.7	83	2
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	127.1	48.8	6.4	115692.4	28.9	98.2	794.6	44.4	1.4	26	97.7	2
10	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	108.6	31	1.2	21498.3	0	108.6	686.9	164.7	5.1	23.7	-4.8	3
10	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	108.6	31.6	1.2	21493.8	0	108.6	681.4	164.7	5.1	23.7	-4.7	3
10	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	109.2	31.6	1.2	21627.6	0	109.2	692.6	163.8	5.1	23.6	-5	3
10	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	110.7	32.2	6.2	112441	28.9	81.8	687	163.8	5.1	86.9	6.7	3
10	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	110.7	31.6	6.2	112442.9	28.9	81.8	692.6	163.8	5.1	86.9	6.7	3
10	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	103.4	32.2	4.9	88377.9	21.7	81.8	687	168	5.2	52.2	11.3	3
10	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	110	31	6.2	112313.7	28.9	81.1	686.9	164.7	5.1	87	6.9	3
10	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	103.4	31.6	4.9	88379.9	21.7	81.8	692.6	168	5.2	52.2	11.3	3
10	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	110	31.6	6.2	112309.2	28.9	81.1	681.4	164.7	5.1	87	6.9	3
10	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	109.2	32.2	1.2	21625.6	0	109.2	687	163.8	5.1	23.6	-5	3
40	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	98.4	19.1	6.1	110008.6	28.9	69.5	561.2	377.8	11.8	187	-186.2	4
40	20	1.2	0.3	0.1	20	80	BB	BB	20	NG	98.5	19.9	6.1	110030.7	28.9	69.6	561.2	376.9	11.8	186.7	-185.5	4
40	20	1.2	0.4	0.1	20	80	BB	BB	20	NG	99	19.7	6.1	110129.6	28.9	70.1	566.9	376.9	11.8	187.2	-186.3	4
40	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	91.8	19.7	4.8	86066.5	21.7	70.1	566.9	381.2	11.9	113.8	-181.7	4
40	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	91.3	19.9	4.8	85967.6	21.7	69.6	561.2	381.2	11.9	113.6	-180.8	4
40	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	97.9	19.3	6.1	109906.6	28.9	69	555.5	377.8	11.8	186.5	-185.3	4
40	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	97	19.9	1.1	19215.3	0	97	561.2	376.9	11.8	53.4	-197.2	4
40	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	97.5	19.7	1.1	19314.2	0	97.5	566.9	376.9	11.8	53.4	-198	4
40	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	96.4	19.3	1.1	19091.2	0	96.4	555.5	377.8	11.8	53.4	-197	4
40	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	96.9	19.1	1.1	19193.3	0	96.9	561.2	377.8	11.8	53.5	-197.9	4

High-Rise MURB - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	20	60	BB	BB	20	Elec	156.6	79.7	1.7	31011.1	0	156.6	939.2	-3.1	-0.1	-0.5	6.1	1
10	40	2.5	0.3	0.1	20	60	BB	BB	20	Elec	157.6	81.2	1.7	31198.3	0	157.6	933.3	-3.1	-0.1	-0.5	3.7	1
10	20	2.5	0.4	0.1	20	60	BB	BB	20	Elec	157.4	80.5	1.7	31161.7	0	157.4	944	-4	-0.1	-0.6	5.1	1
10	20	2.5	0.3	0.1	20	60	BB	BB	20	Elec	158.3	82	1.7	31350.1	0	158.3	938.1	-4	-0.1	-0.6	2.6	1
10	20	2.5	0.4	0.2	20	60	FC	Condensing	20	NG	187.3	108	20	360108.4	103.1	84.2	472.3	-1.7	-0.1	-2	24.9	1
10	20	2.5	0.4	0.2	20	60	FC	Condensing	20	Elec	185.9	108	15	269293	74.2	111.7	472.3	-1.7	-0.1	-0.3	13.2	1
10	40	2.5	0.3	0.1	20	60	BB	BB	20	NG	159	81.2	6.8	122013.7	28.9	130.1	933.3	-3.1	-0.1	-2.7	32.6	1
10	20	2.5	0.3	0.1	20	60	BB	BB	20	NG	159.8	82	6.8	122165.4	28.9	130.9	938.1	-4	-0.1	-3.5	33.5	1
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	158.8	80.5	6.8	121977	28.9	129.9	944	-4	-0.1	-3.5	33.5	1
10	40	2.5	0.4	0.1	20	60	BB	BB	20	NG	158.1	79.7	6.8	121826.4	28.9	129.2	939.2	-3.1	-0.1	-2.7	32.6	1
10	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	132	53.6	6.5	116673	28.9	103.1	772.6	92.3	2.9	64.8	-62.7	2
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	130.4	52.7	1.4	25822.9	0	130.4	778.6	92.3	2.9	14.3	-27	2
10	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	130.6	53.6	1.4	25857.6	0	130.6	772.6	92.3	2.9	14.3	-27	2
10	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	131.1	53.5	1.4	25967.7	0	131.1	783.5	91.4	2.9	14.1	-26.2	2
10	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	131.3	54.3	1.4	26004.3	0	131.3	777.4	91.4	2.9	14.1	-26.2	2
10	20	1.2	0.4	0.1	20	80	BB	BB	20	NG	132.6	53.5	6.5	116783	28.9	103.7	783.5	91.4	2.9	64.5	-61.9	2
10	20	1.2	0.3	0.1	20	80	BB	BB	20	NG	132.8	54.3	6.5	116819.7	28.9	103.9	777.4	91.4	2.9	64.6	-61.9	2
10	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	125.4	53.5	5.2	92720	21.7	103.7	783.5	95.6	3	34.7	-57.2	2
10	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	125.5	54.3	5.2	92756.6	21.7	103.9	777.4	95.6	3	34.8	-57.2	2
10	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	131.9	52.7	6.5	116638.3	28.9	103	778.6	92.3	2.9	64.8	-62.7	2
40	20	1.6	0.3	0.1	20	80	BB	BB	40	NG	109.6	38.2	5	89596.7	21.7	87.9	647.5	328.2	10.3	112.1	-289.7	3
40	40	1.6	0.4	0.1	20	80	BB	BB	20	NG	116.3	37	6.3	113555	28.9	87.4	648.4	324.8	10.1	203.5	-295.3	3
40	40	1.6	0.3	0.1	20	80	BB	BB	20	NG	116.1	37.5	6.3	113518.3	28.9	87.2	642.6	324.8	10.1	203.2	-295.3	3
40	20	1.6	0.3	0.1	20	80	BB	BB	20	NG	116.8	38.2	6.3	113659.8	28.9	87.9	647.5	323.9	10.1	203.7	-294.4	3
40	20	1.6	0.3	0.1	20	80	BB	BB	20	Elec	115.4	38.2	1.3	22844.5	0	115.4	647.5	323.9	10.1	48.8	-258.7	3
40	20	1.6	0.4	0.1	20	80	BB	BB	20	Elec	115.5	37.7	1.3	22879	0	115.5	653.3	323.9	10.1	48.8	-258.7	3
40	40	1.6	0.3	0.1	20	80	BB	BB	20	Elec	114.7	37.5	1.3	22702.9	0	114.7	642.6	324.8	10.1	48.9	-259.6	3
40	40	1.6	0.4	0.1	20	80	BB	BB	20	Elec	114.8	37	1.3	22739.7	0	114.8	648.4	324.8	10.1	48.9	-259.6	3
40	20	1.6	0.4	0.1	20	80	BB	BB	40	NG	109.8	37.7	5	89631.2	21.7	88.1	653.3	328.2	10.3	112.2	-289.7	3
40	20	1.6	0.4	0.1	20	80	BB	BB	20	NG	117	37.7	6.3	113694.3	28.9	88.1	653.3	323.9	10.1	203.9	-294.4	3
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	395.6	12.4	225	-366	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	395.6	12.4	58.1	-330.3	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	399.8	12.5	129.2	-361.4	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	399.8	12.5	58.1	-334.6	4

High-Rise MURB - Highest NPV - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	20	0	FC	Condensing	40	NG	128	47.7	12.4	223585.6	63.3	64.7	308.2	1.8	0.1	0.3	70	1
10	40	2	0.3	0.1	20	0	FC	Condensing	40	NG	127.5	47.3	12.3	222262.7	62.9	64.6	307.5	2.6	0.1	0.4	69.8	1
10	40	2.5	0.4	0.1	20	0	FC	Condensing	40	NG	131.7	49.5	12.7	228556.6	64.6	67.1	320.3	-3.9	-0.1	-0.6	69.9	1
10	40	2.5	0.3	0.1	20	0	FC	Condensing	40	NG	131.8	51.3	13.2	237571.6	67.5	64.2	306.6	-3.9	-0.1	-0.6	71.2	1
10	40	2.5	0.3	0.1	20	0	FC	Condensing	20	NG	139	51.3	14.5	261634.7	74.7	64.2	306.6	-7.6	-0.2	-1.5	66	1
10	20	2	0.4	0.1	20	0	FC	Condensing	40	NG	128.1	46	11.9	214988	60.5	67.6	322	1.8	0.1	0.2	68.4	1
10	20	2.5	0.3	0.1	20	0	FC	Condensing	20	NG	139.5	51.7	14.6	262954.9	75.1	64.3	308.3	-8.4	-0.3	-1.7	66.2	1
10	40	2	0.4	0.1	20	0	FC	Condensing	40	NG	127.6	45.6	11.9	213685.4	60.2	67.5	329.1	2.6	0.1	0.3	68.3	1
10	20	2.5	0.4	0.1	20	0	FC	Condensing	40	NG	132.2	49.9	12.8	229864.1	65	67.2	320.9	-4.7	-0.1	-0.7	70	1
10	20	2.5	0.3	0.1	20	0	FC	Condensing	40	NG	132.2	51.7	13.3	238891.8	67.9	64.3	308.3	-4.7	-0.1	-0.7	71.4	1
10	20	2	0.4	0.1	20	0	BB	BB	40	NG	115.9	45	5	90838	21.7	94.2	517.1	-1.5	0	-0.6	64.9	2
10	40	2.5	0.3	0.1	20	60	FC	Condensing	20	NG	117.1	30.2	10.2	184184.5	51.4	65.7	309	18.6	0.6	2	66.1	2
10	20	2.5	0.3	0.1	20	60	FC	Condensing	20	NG	117.6	30.7	10.3	185436	51.8	65.8	307.6	17.8	0.6	1.9	66.3	2
10	20	2.5	0.3	0.2	20	60	FC	Condensing	40	NG	116.3	36.4	10.2	183159	51.1	65.2	307.8	20.1	0.6	2.1	65.8	2
10	20	2.5	0.4	0.2	20	60	BB	BB	40	NG	104.7	33.6	4.9	88633.6	21.7	83	470.6	16.8	0.5	6.1	65.8	2
10	40	2	0.4	0.1	20	0	BB	BB	40	NG	115.4	44.6	5	90754.8	21.7	93.8	513.9	-0.8	0	-0.3	64.9	2
10	40	2.5	0.3	0.2	20	60	FC	Condensing	40	NG	115.9	36	10.1	181883	50.7	65.1	308	20.9	0.7	2.2	65.6	2
10	40	2.5	0.4	0.2	20	60	BB	BB	40	NG	104.3	33.2	4.9	88553.5	21.7	82.6	467.3	17.6	0.5	6.3	65.7	2
10	40	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	109.9	30.2	8.9	160121.4	44.2	65.7	309	22.3	0.7	2.1	71.3	2
10	20	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	110.3	30.7	9	161372.9	44.5	65.8	307.6	21.5	0.7	2	71.5	2
10	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	106.9	27.2	8.2	148269.5	40.6	66.3	309.6	28	0.9	2.5	69	3
10	20	2	0.4	0.1	20	60	BB	BB	40	NG	95.8	24.2	4.8	86866.1	21.7	74.1	408.9	24.6	0.8	8.6	73.4	3
10	20	2.5	0.4	0.1	20	60	BB	BB	40	NG	99.1	27.7	4.9	87525.2	21.7	77.5	431	18.2	0.6	6.4	74.1	3
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	106.4	27.7	6.2	111588.2	28.9	77.5	431	14.5	0.5	9.7	68.9	3
10	20	2.5	0.3	0.1	20	60	BB	BB	40	NG	99.6	28.7	4.9	87612.1	21.7	77.9	429.3	18.2	0.6	6.4	73.3	3
10	20	2	0.3	0.1	20	60	BB	BB	40	NG	96.1	25.1	4.8	86924.5	21.7	74.4	407.8	24.6	0.8	8.6	72.9	3
10	40	2.5	0.3	0.1	20	60	BB	BB	40	NG	99.2	28.4	4.9	87532.4	21.7	77.5	426	18.9	0.6	6.7	73.2	3
10	40	2.5	0.4	0.1	20	60	BB	BB	40	NG	98.7	27.4	4.9	87446.6	21.7	77.1	427.7	18.9	0.6	6.7	74	3
10	40	2	0.3	0.1	20	60	BB	BB	40	NG	95.7	24.7	4.8	86845.7	21.7	74	404.5	25.4	0.8	8.9	72.8	3
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	95.4	23.8	4.8	86788.5	21.7	73.7	405.6	25.4	0.8	8.9	73.3	3
10	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	85.4	13.7	4.7	84803.4	21.7	63.7	325.7	101.1	3.2	33.9	14.9	4
10	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	85.7	13.3	4.7	84862.9	21.7	64	325.8	101.1	3.2	34	14.4	4
10	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	92.2	13.3	6	108793.4	28.9	63.3	322.3	98.1	3.1	59.6	9.5	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	85.3	13	4.7	84791.6	21.7	63.6	322.5	101.8	3.2	34.2	14.2	4
10	20	1.2	0.3	0.1	20	80	BB	BB	40	Elec	84.3	13.7	0.9	16691.9	0	84.3	325.7	101.1	3.2	14.9	6.1	4
10	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	83.9	13.3	0.9	16618.8	0	83.9	322.3	101.8	3.2	15.1	6	4
10	20	1.2	0.3	0.1	20	80	BB	BB	20	NG	92.6	13.7	6	108866.5	28.9	63.7	325.7	97.4	3	59.3	9.7	4
10	20	1.2	0.4	0.1	20	80	BB	BB	20	NG	92.9	13.3	6.1	108926	28.9	64	325.8	97.4	3	59.4	9.2	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	92.5	13	6	108854.7	28.9	63.6	322.5	98.1	3.1	59.7	9	4
10	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	85	13.3	4.7	84730.3	21.7	63.3	322.3	101.8	3.2	34.1	14.8	4

High-Rise MURB - Highest NPV - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	20	0	FC	Condensing	40	NG	146.8	64.3	14.7	264893.3	75.3	71.5	352.1	2.2	0.1	0.3	74.7	1
10	20	2.5	0.3	0.1	20	60	FC	Condensing	20	NG	133.8	45	12.1	218437.6	61.3	72.5	352	17.4	0.5	1.8	75.1	1
10	40	2.5	0.4	0.1	20	0	FC	Condensing	40	NG	150.9	66.2	15	269987.3	76.7	74.3	358.1	-3.2	-0.1	-0.5	73.7	1
10	40	2.5	0.3	0.1	20	0	FC	Condensing	40	NG	150.9	68	15.5	279531	79.7	71.2	351.1	-3.2	-0.1	-0.5	75.2	1
10	40	2.5	0.3	0.1	20	60	FC	Condensing	20	NG	133.2	44.4	12.1	216912.4	60.8	72.4	351.1	18.1	0.6	1.9	75.2	1
10	40	2	0.4	0.1	20	0	FC	Condensing	40	NG	146.4	62.1	14.1	254149.7	71.9	74.5	358.1	2.9	0.1	0.4	73.1	1
10	20	2.5	0.3	0.1	20	0	FC	Condensing	40	NG	151.5	68.6	15.6	281134.8	80.2	71.4	352.1	-4	-0.1	-0.7	75.1	1
10	40	2	0.3	0.1	20	0	FC	Condensing	40	NG	146.2	63.7	14.6	263289.7	74.8	71.3	351.2	2.9	0.1	0.4	74.9	1
10	20	2.5	0.4	0.1	20	0	FC	Condensing	40	NG	151.6	66.9	15.1	271568.4	77.1	74.5	359	-4	-0.1	-0.6	73.5	1
10	20	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	126.6	45	10.8	194374.5	54.1	72.5	352	20.9	0.7	1.9	80.5	1
10	40	2	0.3	0.1	20	60	FC	Condensing	40	NG	122	40.7	9.9	178587.7	49.3	72.7	351.1	27.8	0.9	2.4	79.2	2
10	20	2.5	0.3	0.1	20	60	BB	BB	40	NG	112.5	40.4	5	90174.1	21.7	90.8	649.9	17.7	0.6	6.3	78.5	2
10	40	2.5	0.4	0.1	20	60	BB	BB	40	NG	111.5	38.7	5	89966.7	21.7	89.8	648.6	18.5	0.6	6.5	79.6	2
10	40	2.5	0.3	0.1	20	60	BB	BB	40	NG	112	39.9	5	90069.8	21.7	90.3	645.5	18.5	0.6	6.5	78.7	2
10	40	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	126	44.4	10.7	192849.4	53.6	72.4	351.1	21.6	0.7	2	80.6	2
10	20	2	0.4	0.1	20	60	BB	BB	40	NG	108.2	35.4	5	89328.2	21.7	86.6	620.2	23.9	0.7	8.3	79.7	2
10	20	2	0.3	0.1	20	60	BB	BB	40	NG	108.6	36.4	5	89407.5	21.7	87	617.1	23.9	0.7	8.3	79	2
10	20	2.5	0.4	0.1	20	60	BB	BB	40	NG	112	39.2	5	90069.5	21.7	90.3	653	17.7	0.6	6.2	79.4	2
10	40	2	0.3	0.1	20	60	BB	BB	40	NG	108.1	35.9	5	89304	21.7	86.4	612.8	24.6	0.8	8.5	79.2	2
10	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	122.6	41.3	10	180099.6	49.8	72.8	352.1	27	0.8	2.3	79.1	2
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	112.4	32.2	6.3	112788.2	28.9	83.5	593	32.6	1	20.7	67.3	3
10	40	2	0.4	0.1	20	60	BB	BB	40	Elec	106.6	34.9	1.2	21114.7	0	106.6	615.8	24.6	0.8	3.7	71.1	3
10	40	2	0.4	0.1	20	60	BB	BB	20	NG	114.9	34.9	6.3	113289.3	28.9	86	615.8	21.1	0.7	13.6	74.5	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.2	32.6	6.3	112741.6	28.9	83.3	585.5	33.3	1	21.1	67	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	111.9	31.7	6.3	112687.1	28.9	83	588.6	33.3	1	21	67.5	3
10	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	105.5	33.1	4.9	88781.3	21.7	83.8	589.9	36.1	1.1	12.4	72.2	3
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	107.7	34.9	5	89226.3	21.7	86	615.8	24.6	0.8	8.5	79.9	3
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	105.2	32.2	4.9	88725.1	21.7	83.5	593	36.1	1.1	12.4	72.7	3
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	104.7	31.7	4.9	88624	21.7	83	588.6	36.9	1.2	12.6	72.9	3
10	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	105	32.6	4.9	88678.6	21.7	83.3	585.5	36.9	1.2	12.6	72.4	3
10	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	93.2	19.5	4.8	86355	21.7	71.5	495	135.5	4.2	44.5	-6	4
10	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	93	20	4.8	86302.9	21.7	71.3	491.8	135.5	4.2	44.4	-5.5	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	94.4	22	1	18687.4	0	94.4	519.9	97.2	3	14.3	19.7	4
10	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	99.7	19.5	6.1	110269.9	28.9	70.8	487.4	132.7	4.1	77.2	-10.8	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	102.7	22	6.2	110862	28.9	73.8	519.9	93.7	2.9	55.6	23	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	95.5	22	4.8	86798.9	21.7	73.8	519.9	97.2	3	32.2	28.4	4
10	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	92.5	19.5	4.8	86206.8	21.7	70.8	487.4	136.2	4.3	44.6	-5.4	4
10	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	92.7	19	4.8	86260.8	21.7	71.1	490.6	136.2	4.3	44.6	-5.9	4
10	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	100.2	20	6.1	110365.9	28.9	71.3	491.8	132	4.1	77	-10.9	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	101.2	22	1.1	20046.6	0	101.2	519.9	93.7	2.9	13.9	11.3	4

High-Rise MURB - Highest NPV - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.3	0.1	20	60	BB	BB	40	NG	125.2	54.7	5.1	92680.9	21.7	103.5	820.8	33.8	1.1	11.3	108.1	1
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	124.3	53.4	5.1	92508.9	21.7	102.6	826.4	33.8	1.1	11.3	109.6	1
10	40	2	0.4	0.1	20	60	BB	BB	20	NG	131.5	53.4	6.5	116572	28.9	102.6	826.4	29.5	0.9	17.8	104.9	1
10	40	2.5	0.4	0.1	20	60	BB	BB	40	NG	129.8	59	5.2	93589.2	21.7	108.1	863.7	26.4	0.8	9	107.6	1
10	20	2	0.4	0.1	20	60	BB	BB	40	NG	125	54.1	5.1	92646.4	21.7	103.3	832.5	32.9	1	11	109.3	1
10	40	2.5	0.3	0.1	20	60	BB	BB	40	NG	130.8	60.5	5.2	93793.3	21.7	109.1	858.1	26.4	0.8	9	105.8	1
10	20	2.5	0.4	0.1	20	60	BB	BB	40	NG	130.5	59.7	5.2	93727.4	21.7	108.8	869.8	25.5	0.8	8.7	107.3	1
10	20	2	0.3	0.1	20	60	BB	BB	40	NG	125.9	55.4	5.2	92820	21.7	104.2	827	32.9	1	11.1	107.8	1
10	20	2.5	0.3	0.1	20	60	BB	BB	40	NG	131.5	61.2	5.2	93932.9	21.7	109.8	864.3	25.5	0.8	8.8	105.5	1
10	20	2	0.4	0.1	20	60	BB	BB	20	NG	132.2	54.1	6.5	116709.4	28.9	103.3	832.5	28.6	0.9	17.4	104.6	1
10	40	1.6	0.4	0.1	20	60	BB	BB	40	Elec	118.8	48.8	1.3	23517.8	0	118.8	794.6	48.7	1.5	7.1	93.6	2
10	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	116.6	45.9	5.1	90985.2	21.7	94.9	761.4	70	2.2	22.8	86.6	2
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	127.8	49.5	6.4	115829.1	28.9	98.9	800.7	43.5	1.4	25.6	97.4	2
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	120.5	49.5	5.1	91766	21.7	98.9	800.7	47.8	1.5	15.7	102.1	2
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	119.9	48.8	5.1	91629.3	21.7	98.2	794.6	48.7	1.5	16	102.4	2
10	40	1.2	0.3	0.1	20	60	BB	BB	40	NG	115.9	45.3	5	90847.5	21.7	94.2	755.2	70.9	2.2	23	86.9	2
10	40	1.2	0.4	0.1	20	60	BB	BB	40	NG	115.3	44.2	5	90736.8	21.7	93.7	760.8	70.9	2.2	22.9	87.9	2
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	127.1	48.8	6.4	115692.4	28.9	98.2	794.6	44.4	1.4	26	97.7	2
10	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	116	44.8	5	90872.5	21.7	94.4	766.9	70	2.2	22.7	87.6	2
10	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	119.5	49.5	1.3	23654.5	0	119.5	800.7	47.8	1.5	7	93.3	2
10	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	110.7	32.2	6.2	112441	28.9	81.8	687	163.8	5.1	86.9	6.7	3
10	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	110.7	31.6	6.2	112442.9	28.9	81.8	692.6	163.8	5.1	86.9	6.7	3
10	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	110	31.6	6.2	112309.2	28.9	81.1	681.4	164.7	5.1	87	6.9	3
10	40	0.8	0.4	0.1	20	80	BB	BB	40	Elec	101.7	31	1.1	20139.1	0	101.7	686.9	168.9	5.3	24.1	2.8	3
10	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	101.7	31.6	1.1	20134.6	0	101.7	681.4	168.9	5.3	24.1	2.8	3
10	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	102.8	31.6	4.9	88246.1	21.7	81.1	681.4	168.9	5.3	52.3	11.6	3
10	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	102.8	31	4.9	88250.6	21.7	81.1	686.9	168.9	5.3	52.3	11.6	3
10	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	110	31	6.2	112313.7	28.9	81.1	686.9	164.7	5.1	87	6.9	3
10	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	103.4	31.6	4.9	88379.9	21.7	81.8	692.6	168	5.2	52.2	11.3	3
10	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	103.4	32.2	4.9	88377.9	21.7	81.8	687	168	5.2	52.2	11.3	3
40	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	90.6	19.3	4.8	85843.5	21.7	69	555.5	382.1	11.9	113.6	-180.6	4
40	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	91.8	19.7	4.8	86066.5	21.7	70.1	566.9	381.2	11.9	113.8	-181.7	4
40	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	91.3	19.9	4.8	85967.6	21.7	69.6	561.2	381.2	11.9	113.6	-180.8	4
40	20	1.2	0.3	0.1	20	80	BB	BB	40	Elec	90.2	19.9	1	17856.1	0	90.2	561.2	381.2	11.9	53.4	-189.6	4
40	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	89.6	19.3	1	17732	0	89.6	555.5	382.1	11.9	53.5	-189.4	4
40	20	1.2	0.3	0.1	20	80	BB	BB	20	NG	98.5	19.9	6.1	110030.7	28.9	69.6	561.2	376.9	11.8	186.7	-185.5	4
40	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	98.4	19.1	6.1	110008.6	28.9	69.5	561.2	377.8	11.8	187	-186.2	4
40	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	97.9	19.3	6.1	109906.6	28.9	69	555.5	377.8	11.8	186.5	-185.3	4
40	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	91.2	19.1	4.8	85945.5	21.7	69.5	561.2	382.1	11.9	113.8	-181.5	4
40	20	1.2	0.4	0.1	20	80	BB	BB	20	NG	99	19.7	6.1	110129.6	28.9	70.1	566.9	376.9	11.8	187.2	-186.3	4

High-Rise MURB - Highest NPV - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.4	0.1	20	60	FC	Condensing	40	NG	160.5	89.8	14.9	267739.2	75.3	85.1	472.5	12.5	0.4	2.1	43.4	1
10	40	2	0.3	0.1	20	60	FC	Condensing	40	NG	159.9	90.8	15.4	277575.9	78.5	81.4	463	12.5	0.4	2.3	45.8	1
10	40	2.5	0.4	0.1	20	60	FC	Condensing	40	NG	167.3	96.2	16.2	292218.4	82.7	84.6	471.7	5	0.2	1.1	42.7	1
10	40	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	167	97.3	16.8	302711.8	86.1	80.9	462.2	5	0.2	1.2	44.8	1
10	20	2	0.4	0.1	20	60	FC	Condensing	40	NG	161.3	90.7	15	270120.9	76	85.3	473.4	11.6	0.4	2	43.2	1
10	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	160.8	91.7	15.6	279991.7	79.2	81.6	463.9	11.6	0.4	2.2	45.6	1
10	20	2.5	0.4	0.1	20	60	FC	Condensing	40	NG	168.1	97	16.4	294614.3	83.4	84.7	472.5	4.1	0.1	0.9	42.4	1
10	20	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	167.9	98.2	17	305137.9	86.8	81.1	463	4.1	0.1	1.1	44.5	1
10	40	2	0.3	0.1	20	60	FC	Condensing	20	NG	167.2	90.8	16.8	301639	85.7	81.4	463	8.2	0.3	2	41.2	1
10	20	2	0.3	0.1	20	60	FC	Condensing	20	NG	168	91.7	16.9	304054.8	86.5	81.6	463.9	7.3	0.2	1.8	40.9	1
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	130.4	52.7	1.4	25822.9	0	130.4	778.6	92.3	2.9	14.3	-27	2
10	20	1.2	0.3	0.1	20	80	BB	BB	40	NG	125.5	54.3	5.2	92756.6	21.7	103.9	777.4	95.6	3	34.8	-57.2	2
10	20	1.2	0.4	0.1	20	80	BB	BB	40	NG	125.4	53.5	5.2	92720	21.7	103.7	783.5	95.6	3	34.7	-57.2	2
10	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	131.3	54.3	1.4	26004.3	0	131.3	777.4	91.4	2.9	14.1	-26.2	2
10	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	131.1	53.5	1.4	25967.7	0	131.1	783.5	91.4	2.9	14.1	-26.2	2
10	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	123.5	52.7	1.4	24463.7	0	123.5	778.6	96.5	3	14.7	-31.3	2
10	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	123.7	53.6	1.4	24498.4	0	123.7	772.6	96.5	3	14.8	-31.3	2
10	20	1.2	0.4	0.1	20	80	BB	BB	40	Elec	124.3	53.5	1.4	24608.4	0	124.3	783.5	95.6	3	14.6	-30.4	2
10	20	1.2	0.3	0.1	20	80	BB	BB	40	Elec	124.5	54.3	1.4	24645.1	0	124.5	777.4	95.6	3	14.6	-30.4	2
10	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	130.6	53.6	1.4	25857.6	0	130.6	772.6	92.3	2.9	14.3	-27	2
40	40	1.6	0.4	0.1	20	80	BB	BB	40	Elec	108	37	1.2	21380.4	0	108	648.4	329.1	10.3	49	-263.8	3
40	40	1.6	0.3	0.1	20	80	BB	BB	40	Elec	107.8	37.5	1.2	21343.7	0	107.8	642.6	329.1	10.3	49	-263.8	3
40	20	1.6	0.4	0.1	20	80	BB	BB	40	Elec	108.7	37.7	1.2	21519.7	0	108.7	653.3	328.2	10.3	48.9	-263	3
40	40	1.6	0.4	0.1	20	80	BB	BB	20	Elec	114.8	37	1.3	22739.7	0	114.8	648.4	324.8	10.1	48.9	-259.6	3
40	40	1.6	0.3	0.1	20	80	BB	BB	20	Elec	114.7	37.5	1.3	22702.9	0	114.7	642.6	324.8	10.1	48.9	-259.6	3
40	20	0.8	0.4	0.1	20	60	BB	BB	20	Elec	113.8	36	1.3	22533.8	0	113.8	609.8	342.6	10.7	51.5	-277.4	3
40	20	0.8	0.3	0.1	20	60	BB	BB	20	Elec	113.6	36.4	1.2	22493.3	0	113.6	604.7	342.6	10.7	51.5	-277.4	3
40	20	1.6	0.4	0.1	20	80	BB	BB	20	Elec	115.5	37.7	1.3	22879	0	115.5	653.3	323.9	10.1	48.8	-258.7	3
40	20	1.6	0.3	0.1	20	80	BB	BB	20	Elec	115.4	38.2	1.3	22844.5	0	115.4	647.5	323.9	10.1	48.8	-258.7	3
40	20	1.6	0.3	0.1	20	80	BB	BB	40	Elec	108.5	38.2	1.2	21485.2	0	108.5	647.5	328.2	10.3	48.9	-263	3
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	395.6	12.4	58.1	-330.3	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	399.8	12.5	58.1	-334.6	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	399.8	12.5	129.2	-361.4	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	395.6	12.4	225	-366	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	141.4	64	6.6	118523.5	28.9	112.5	631.8	-13.1	-0.4	-11.8	36	1
7	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	139.6	61.7	6.6	118167.3	28.9	110.7	634.9	-12.3	-0.4	-10.9	38.3	1
10	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	133	55.2	6.5	116872.5	28.9	104.1	586.3	-12.3	-0.4	-10.3	49.6	1
7	20	2.5	0.3	0.1	20	0	BB	BB	20	NG	134.7	57.1	6.5	117190.9	28.9	105.7	586.4	-11.7	-0.4	-9.9	46.2	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	140	62.2	6.6	118251.4	28.9	111.1	638.2	-13.1	-0.4	-11.7	38.4	1
7	20	2.5	0.4	0.1	20	0	BB	BB	20	NG	133.5	55.5	6.5	116953.6	28.9	104.5	595.4	-11.7	-0.4	-9.8	48.3	1
7	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	141	63.6	6.6	118438.8	28.9	112	628.5	-12.3	-0.4	-11.1	35.9	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	134.8	57.5	6.5	117229.2	28.9	105.9	578.6	-13.1	-0.4	-11.1	47.3	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	133.5	55.7	6.5	116956.9	28.9	104.6	589.6	-13.1	-0.4	-11	49.6	1
10	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	134.4	57.1	6.5	117144.2	28.9	105.5	575.4	-12.3	-0.4	-10.4	47.2	1
10	40	1.6	0.3	0.1	20	0	FC	Condensing	20	Elec	129.9	44	8	143234.5	37.5	92.3	312	11.8	0.4	1	44.1	2
10	40	2	0.4	0.1	20	0	BB	BB	20	NG	122.7	44.6	6.4	114817.9	28.9	93.8	513.9	-4.5	-0.1	-3.4	59.7	2
10	40	2	0.4	0.1	20	0	BB	BB	40	Elec	114.4	44.6	1.3	22643.3	0	114.4	513.9	-0.8	0	-0.1	56.1	2
10	20	2	0.4	0.1	20	0	BB	BB	40	Elec	114.8	45	1.3	22726.5	0	114.8	517.1	-1.5	0	-0.2	56.2	2
10	40	2	0.4	0.1	20	0	BB	BB	20	Elec	121.2	44.6	1.3	24002.5	0	121.2	513.9	-4.5	-0.1	-0.7	48	2
10	20	1.6	0.4	0.1	20	0	BB	BB	20	Elec	118.5	41.7	1.3	23457.4	0	118.5	494.8	7.7	0.2	1.2	40.6	2
10	20	2	0.4	0.1	20	0	BB	BB	20	Elec	121.6	45	1.3	24085.8	0	121.6	517.1	-5.3	-0.2	-0.8	48	2
10	40	2	0.4	0.1	20	0	BB	BB	40	NG	115.4	44.6	5	90754.8	21.7	93.8	513.9	-0.8	0	-0.3	64.9	2
10	20	2	0.4	0.1	20	0	BB	BB	20	NG	123.1	45	6.4	114901.1	28.9	94.2	517.1	-5.3	-0.2	-4	59.7	2
10	20	2	0.4	0.1	20	0	BB	BB	40	NG	115.9	45	5	90838	21.7	94.2	517.1	-1.5	0	-0.6	64.9	2
10	20	2	0.4	0.1	20	60	FC	Condensing	20	Elec	114	26.4	4.2	76082.2	17.1	97	319.8	24.2	0.8	1.6	48.9	3
10	20	2	0.3	0.1	20	60	FC	Condensing	20	Elec	112.7	27.2	4.5	81517.2	18.9	93.8	309.6	24.2	0.8	1.6	52.1	3
10	20	2.5	0.4	0.1	20	60	FC	Condensing	20	Elec	117.2	29.7	4.9	88545.6	20.9	96.4	319.8	17.8	0.6	1.2	51.8	3
10	40	2	0.4	0.1	20	60	FC	Condensing	20	Elec	113.6	26	4.2	74879.5	16.7	96.9	328.6	25	0.8	1.6	48.7	3
10	20	2	0.4	0.1	20	60	FC	Condensing	40	Elec	107.2	26.4	4.2	74722.9	17.1	90.1	319.8	28	0.9	1.8	57.1	3
10	20	2	0.3	0.1	20	60	FC	Condensing	40	Elec	105.8	27.2	4.5	80158	18.9	86.9	309.6	28	0.9	1.8	60.3	3
10	40	2.5	0.4	0.1	20	60	FC	Condensing	40	Elec	109.9	29.2	4.8	85963.1	20.5	89.4	326.9	22.3	0.7	1.5	59.7	3
10	40	2.5	0.4	0.1	20	60	FC	Condensing	20	Elec	116.8	29.2	4.9	87322.3	20.5	96.3	326.9	18.6	0.6	1.3	51.6	3
10	20	2.5	0.4	0.1	20	60	FC	Condensing	40	Elec	110.4	29.7	4.8	87186.4	20.9	89.5	319.8	21.5	0.7	1.5	59.9	3
10	40	2	0.3	0.1	20	60	FC	Condensing	20	Elec	112.2	26.8	4.5	80285.8	18.5	93.7	308.6	25	0.8	1.7	52	3
10	20	0.8	0.3	0.1	20	80	FC	Condensing	40	Elec	94.4	15	1.9	33779.2	4.8	89.6	309.5	145.5	4.5	8.2	-44.5	4
10	20	0.8	0.3	0.1	20	80	FC	Condensing	40	NG	95.5	15	5.7	101890.7	26.5	69	309.5	145.5	4.5	10.5	-35.7	4
10	40	0.8	0.3	0.1	20	80	FC	ASHP	40	NG	92.9	14.6	5	90517	23	69.9	305.7	188.6	5.9	13	-76.1	4
10	20	0.8	0.3	0.1	20	80	FC	ASHP	40	NG	93.2	15	5	90866.5	23.1	70	309.5	187.9	5.9	12.9	-75.7	4
10	40	0.8	0.4	0.1	20	80	FC	Condensing	40	NG	97.8	14.7	5.5	98718.6	25.3	72.4	325	146.2	4.6	10.4	-40.9	4
10	40	0.8	0.3	0.1	20	80	FC	Condensing	40	NG	95.1	14.6	5.6	100807.4	26.2	68.9	305.7	146.2	4.6	10.5	-36	4
10	40	0.8	0.3	0.1	20	80	FC	Condensing	40	Elec	94	14.6	1.8	32695.9	4.5	89.5	305.7	146.2	4.6	8.2	-44.7	4
10	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	91.2	13.7	1	18051.1	0	91.2	325.7	97.4	3	14.6	-2	4
10	40	0.8	0.4	0.1	20	80	FC	ASHP	40	NG	96	14.7	5	90338.7	22.8	73.2	325	188.6	5.9	13	-81.5	4
10	40	0.8	0.4	0.1	20	80	FC	Condensing	40	Elec	96.7	14.7	1.7	30607.1	3.7	93	325	146.2	4.6	8.2	-49.7	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	159.1	80.1	6.8	122039.2	28.9	130.2	885.7	-12	-0.4	-11.3	31.3	1
7	20	2.5	0.3	0.1	20	0	BB	BB	20	NG	151.4	72.3	6.7	120505.4	28.9	122.5	831.2	-10.7	-0.3	-9.3	43.3	1
10	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	149.7	70.4	6.7	120171.8	28.9	120.8	827.3	-11.2	-0.4	-9.6	46.8	1
10	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	151	72.2	6.7	120436.3	28.9	122.1	824.3	-11.2	-0.4	-9.7	44.5	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	150.2	70.9	6.7	120279.7	28.9	121.3	831.7	-12	-0.4	-10.3	46.6	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	151.6	72.8	6.7	120544.8	28.9	122.7	828.7	-12	-0.4	-10.4	44.3	1
7	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	157.3	77.8	6.8	121666.6	28.9	128.4	884.4	-11.2	-0.4	-10.4	33.8	1
7	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	158.6	79.6	6.8	121930.9	28.9	129.7	881.4	-11.2	-0.4	-10.5	31.5	1
7	20	2.5	0.4	0.1	20	0	BB	BB	20	NG	150.2	70.6	6.7	120266.2	28.9	121.3	834.1	-10.7	-0.3	-9.2	45.4	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	157.8	78.3	6.8	121774.2	28.9	128.9	888.7	-12	-0.4	-11.1	33.6	1
10	20	2.5	0.4	0.1	20	60	FC	Condensing	40	Elec	126.6	44	6.6	119402.3	30.1	96.5	359	20.9	0.7	1.4	68.8	2
10	40	2.5	0.3	0.1	20	60	FC	Condensing	40	Elec	124.9	44.4	6.9	124737.8	31.9	93	351.1	21.6	0.7	1.5	71.8	2
10	40	2.5	0.4	0.1	20	60	FC	Condensing	40	Elec	126	43.4	6.6	117906.5	29.7	96.3	358.1	21.6	0.7	1.4	68.8	2
10	40	2	0.4	0.1	20	60	FC	Condensing	20	Elec	129.1	39.8	5.9	105523.4	25.5	103.5	358.1	24.2	0.8	1.5	58.9	2
10	40	2	0.3	0.1	20	60	FC	Condensing	20	Elec	127.8	40.7	6.2	111835.5	27.6	100.1	351.1	24.2	0.8	1.6	62.2	2
10	20	2	0.4	0.1	20	60	FC	Condensing	20	Elec	129.7	40.4	5.9	107004.4	26	103.7	359.1	23.5	0.7	1.5	58.8	2
10	20	2	0.4	0.1	20	60	FC	Condensing	40	Elec	122.8	40.4	5.9	105645.2	26	96.8	359.1	27	0.8	1.7	67.1	2
10	20	2	0.3	0.1	20	60	FC	Condensing	40	Elec	121.5	41.3	6.2	111988.1	28.1	93.4	352.1	27	0.8	1.8	70.4	2
10	40	2	0.4	0.1	20	60	FC	Condensing	40	Elec	122.2	39.8	5.8	104164.1	25.5	96.7	358.1	27.8	0.9	1.8	67.2	2
10	20	2	0.3	0.1	20	60	FC	Condensing	20	Elec	128.4	41.3	6.3	113347.3	28.1	100.3	352.1	23.5	0.7	1.5	62.1	2
10	40	2	0.3	0.1	20	80	FC	Condensing	40	Elec	114	33.9	4.7	85301.5	20	94	351.2	69.7	2.2	4.1	36.7	3
10	40	1.2	0.4	0.1	20	60	FC	Condensing	40	Elec	116.1	33.9	4.6	81937.1	18.8	97.3	358.4	58.4	1.8	3.4	43.7	3
10	20	1.2	0.4	0.1	20	60	FC	Condensing	40	Elec	116.7	34.5	4.6	83377.3	19.2	97.5	359.3	57.7	1.8	3.4	43.7	3
10	20	2	0.4	0.1	20	80	FC	Condensing	40	Elec	116.3	33.9	4.5	81521.2	18.7	97.6	359.3	69	2.2	4.1	32.8	3
10	40	2	0.4	0.1	20	80	FC	Condensing	40	Elec	115.7	33.3	4.4	80101.9	18.3	97.4	358.4	69.7	2.2	4.1	32.9	3
10	40	1.2	0.3	0.1	20	60	FC	Condensing	40	Elec	114.4	34.5	4.9	87314.8	20.6	93.8	350.8	58.4	1.8	3.5	47.6	3
10	20	1.2	0.4	0.1	20	60	FC	Condensing	40	NG	117.8	34.5	8.4	151488.9	40.9	76.9	359.3	57.7	1.8	4.4	52.4	3
10	40	2	0.4	0.1	20	60	BB	BB	40	Elec	106.6	34.9	1.2	21114.7	0	106.6	615.8	24.6	0.8	3.7	71.1	3
10	40	2	0.4	0.1	20	60	BB	BB	20	Elec	113.5	34.9	1.2	22474	0	113.5	615.8	21.1	0.7	3.2	62.8	3
10	20	2	0.3	0.1	20	80	FC	Condensing	40	Elec	114.6	34.5	4.8	86757	20.5	94.1	352.1	69	2.2	4.1	36.7	3
40	40	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	107.4	20.4	2	35350.8	4.5	102.9	351.5	296.5	9.3	15.1	-186.3	4
40	40	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	104.8	20.2	2.1	38106.4	5.5	99.2	344.2	296.5	9.3	15.3	-181.2	4
40	20	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	107.9	20.9	2	36630.6	4.9	103	352.4	295.7	9.2	15.2	-186.2	4
40	20	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	105.3	20.8	2.2	39434.1	5.9	99.4	345.1	295.7	9.2	15.3	-181.2	4
40	40	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	97.9	20.2	2	36747.2	5.5	92.4	344.2	300	9.4	15.4	-172.9	4
10	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	94.4	22	1	18687.4	0	94.4	519.9	97.2	3	14.3	19.7	4
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	101.2	22	1.1	20046.6	0	101.2	519.9	93.7	2.9	13.9	11.3	4
40	20	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	98.4	20.8	2.1	38074.8	5.9	92.5	345.1	299.3	9.3	15.4	-172.9	4
40	20	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	101	20.9	2	35271.4	4.9	96.2	352.4	299.3	9.3	15.3	-177.9	4
40	40	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	100.5	20.4	1.9	33991.5	4.5	96	351.5	300	9.4	15.3	-177.9	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.1	20	0	BB	BB	20	NG	180.9	103.7	7	126350.6	28.9	152	1058.7	-8.9	-0.3	-8	41.4	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	178.9	101.4	7	125950.6	28.9	150	1062.7	-10.5	-0.3	-9.2	48.2	1
7	20	2.5	0.4	0.1	20	0	BB	BB	20	NG	179.1	101.5	7	125994.1	28.9	150.2	1064.3	-8.9	-0.3	-7.8	46	1
7	40	2.5	0.3	0.1	20	0	BB	BB	20	NG	180.2	103	7	126208.6	28.9	151.3	1052.6	-8	-0.2	-7.1	42.3	1
7	40	2.5	0.4	0.1	20	0	BB	BB	20	NG	178.4	100.8	7	125852.8	28.9	149.5	1058.2	-8	-0.2	-7	47	1
10	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	178.2	100.7	7	125808.3	28.9	149.3	1056.5	-9.6	-0.3	-8.4	49.1	1
10	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	180.1	103.1	7	126194.8	28.9	151.2	1051	-9.6	-0.3	-8.5	44.1	1
10	20	2.5	0.4	0.1	20	0	BB	BB	20	NG	168.7	91.2	6.9	123938.2	28.9	139.8	989.7	-8.9	-0.3	-7.1	72.8	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	180.8	103.8	7	126337.7	28.9	151.9	1057.1	-10.5	-0.3	-9.4	43.1	1
10	20	2.5	0.3	0.1	20	0	BB	BB	20	NG	170.5	93.4	6.9	124290.8	28.9	141.6	984.1	-8.9	-0.3	-7.2	68.2	1
10	40	1.2	0.3	0.1	20	80	FC	Condensing	20	Elec	125.4	45.7	5.3	96249.1	22.8	102.6	420.4	121.3	3.8	5.7	-5	2
10	40	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	131	49.3	5.8	105020.4	25.3	105.7	428.8	99	3.1	4.8	8.8	2
10	40	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	129.7	49.9	6.2	112266.8	27.6	102.1	420	99	3.1	4.8	12.1	2
10	20	0.8	0.4	0.1	20	60	FC	Condensing	20	Elec	131.5	49.9	5.8	105075.4	25.2	106.2	431	116.8	3.6	5.6	-9.9	2
10	20	1.2	0.3	0.1	20	80	FC	Condensing	20	Elec	126.1	46.5	5.5	98262.1	23.4	102.7	421.4	120.4	3.8	5.7	-5.2	2
10	20	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	127.6	46.1	5.1	91637.4	21.2	106.5	430.3	120.4	3.8	5.6	-8.9	2
10	40	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	126.9	45.4	5	89678.5	20.6	106.3	429.3	121.3	3.8	5.6	-8.8	2
10	40	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	122.8	49.9	6.2	110907.6	27.6	95.2	420	103.3	3.2	5	19.7	2
10	40	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	124.1	49.3	5.8	103661.2	25.3	98.8	428.8	103.3	3.2	4.9	16.4	2
10	40	0.8	0.4	0.1	20	60	FC	Condensing	20	Elec	130.7	49.1	5.7	103065.6	24.6	106.1	430	117.7	3.7	5.6	-9.8	2
40	40	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	111	33.6	3	53573.7	10.1	100.9	413.7	359.4	11.2	15.2	-224.5	3
40	40	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	113.2	33.7	2.7	48962.6	8.5	104.7	422.6	359.4	11.2	15	-229.2	3
40	40	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	110.7	30.9	2.1	38029.6	5.1	105.5	423.2	381.7	11.9	15.5	-248.7	3
40	20	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	113.9	34.5	2.8	50825	9	104.9	423.6	358.5	11.2	15	-229.2	3
40	20	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	104.8	34.3	3	54121.7	10.7	94.2	414.7	362.8	11.3	15.3	-217.1	3
40	20	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	107	34.5	2.7	49465.7	9	98	423.6	362.8	11.3	15.2	-221.7	3
40	20	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	111.4	31.6	2.2	39840.5	5.7	105.7	424.2	380.8	11.9	15.6	-248.8	3
40	40	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	106.3	33.7	2.6	47603.4	8.5	97.8	422.6	363.7	11.4	15.1	-221.6	3
40	40	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	104.1	33.6	2.9	52214.5	10.1	94	413.7	363.7	11.4	15.3	-217	3
40	20	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	111.7	34.3	3.1	55481	10.7	101	414.7	358.5	11.2	15.2	-224.6	3
40	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	97	19.9	1.1	19215.3	0	97	561.2	376.9	11.8	53.4	-197.2	4
40	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	90.1	19.1	1	17834	0	90.1	561.2	382.1	11.9	53.5	-190.3	4
40	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	89.6	19.3	1	17732	0	89.6	555.5	382.1	11.9	53.5	-189.4	4
40	20	0.8	0.3	0.1	20	80	BB	BB	40	Elec	87.1	16.5	1	17252.1	0	87.1	525.8	428.4	13.4	59.7	-231.5	4
40	20	1.2	0.4	0.1	20	80	BB	BB	40	Elec	90.7	19.7	1	17955	0	90.7	566.9	381.2	11.9	53.4	-190.4	4
40	20	1.2	0.3	0.1	20	80	BB	BB	40	Elec	90.2	19.9	1	17856.1	0	90.2	561.2	381.2	11.9	53.4	-189.6	4
40	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	96.9	19.1	1.1	19193.3	0	96.9	561.2	377.8	11.8	53.5	-197.9	4
40	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	96.4	19.3	1.1	19091.2	0	96.4	555.5	377.8	11.8	53.4	-197	4
40	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	94	16.5	1	18611.3	0	94	525.8	424.2	13.3	59.8	-239.1	4
40	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	97.5	19.7	1.1	19314.2	0	97.5	566.9	376.9	11.8	53.4	-198	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.2	20	60	FC	Condensing	20	NG	186.5	107.1	19.9	357683.5	102.4	84.1	471.5	-0.8	0	-0.8	25.1	1
10	40	2.5	0.3	0.2	20	60	FC	Condensing	20	NG	186.6	108.5	20.5	369139.4	106.1	80.5	462	-0.8	0	-2.4	26.7	1
10	20	2.5	0.4	0.2	20	60	FC	Condensing	20	NG	187.3	108	20	360108.4	103.1	84.2	472.3	-1.7	-0.1	-2	24.9	1
10	20	2.5	0.3	0.1	20	60	BB	BB	20	NG	159.8	82	6.8	122165.4	28.9	130.9	938.1	-4	-0.1	-3.5	33.5	1
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	158.8	80.5	6.8	121977	28.9	129.9	944	-4	-0.1	-3.5	33.5	1
10	40	2.5	0.3	0.1	20	60	BB	BB	20	NG	159	81.2	6.8	122013.7	28.9	130.1	933.3	-3.1	-0.1	-2.7	32.6	1
10	40	2.5	0.4	0.1	20	60	BB	BB	20	NG	158.1	79.7	6.8	121826.4	28.9	129.2	939.2	-3.1	-0.1	-2.7	32.6	1
10	20	2.5	0.3	0.1	20	60	BB	BB	20	Elec	158.3	82	1.7	31350.1	0	158.3	938.1	-4	-0.1	-0.6	2.6	1
10	20	2.5	0.4	0.1	20	60	BB	BB	20	Elec	157.4	80.5	1.7	31161.7	0	157.4	944	-4	-0.1	-0.6	5.1	1
10	40	2.5	0.3	0.1	20	60	BB	BB	20	Elec	157.6	81.2	1.7	31198.3	0	157.6	933.3	-3.1	-0.1	-0.5	3.7	1
10	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	123.7	53.6	1.4	24498.4	0	123.7	772.6	96.5	3	14.8	-31.3	2
40	20	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	125.6	52.5	3.5	62288	11.9	113.6	468.8	350	10.9	20.1	-265	2
10	20	1.2	0.3	0.1	20	80	BB	BB	40	Elec	124.5	54.3	1.4	24645.1	0	124.5	777.4	95.6	3	14.6	-30.4	2
10	20	1.2	0.4	0.1	20	80	BB	BB	40	Elec	124.3	53.5	1.4	24608.4	0	124.3	783.5	95.6	3	14.6	-30.4	2
40	40	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	124.8	51.7	3.3	60125.9	11.3	113.5	468	350.9	11	20	-264.9	2
10	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	123.5	52.7	1.4	24463.7	0	123.5	778.6	96.5	3	14.7	-31.3	2
10	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	131.3	54.3	1.4	26004.3	0	131.3	777.4	91.4	2.9	14.1	-26.2	2
10	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	131.1	53.5	1.4	25967.7	0	131.1	783.5	91.4	2.9	14.1	-26.2	2
10	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	130.4	52.7	1.4	25822.9	0	130.4	778.6	92.3	2.9	14.3	-27	2
10	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	130.6	53.6	1.4	25857.6	0	130.6	772.6	92.3	2.9	14.3	-27	2
40	20	0.8	0.4	0.1	20	60	BB	BB	20	Elec	113.8	36	1.3	22533.8	0	113.8	609.8	342.6	10.7	51.5	-277.4	3
40	20	1.6	0.4	0.1	20	80	BB	BB	20	Elec	115.5	37.7	1.3	22879	0	115.5	653.3	323.9	10.1	48.8	-258.7	3
40	40	1.6	0.4	0.1	20	80	BB	BB	40	Elec	108	37	1.2	21380.4	0	108	648.4	329.1	10.3	49	-263.8	3
40	40	1.6	0.3	0.1	20	80	BB	BB	40	Elec	107.8	37.5	1.2	21343.7	0	107.8	642.6	329.1	10.3	49	-263.8	3
40	20	1.6	0.4	0.1	20	80	BB	BB	40	Elec	108.7	37.7	1.2	21519.7	0	108.7	653.3	328.2	10.3	48.9	-263	3
40	20	1.6	0.3	0.1	20	80	BB	BB	40	Elec	108.5	38.2	1.2	21485.2	0	108.5	647.5	328.2	10.3	48.9	-263	3
40	40	1.6	0.4	0.1	20	80	BB	BB	20	Elec	114.8	37	1.3	22739.7	0	114.8	648.4	324.8	10.1	48.9	-259.6	3
40	40	1.6	0.3	0.1	20	80	BB	BB	20	Elec	114.7	37.5	1.3	22702.9	0	114.7	642.6	324.8	10.1	48.9	-259.6	3
40	20	0.8	0.3	0.1	20	60	BB	BB	20	Elec	113.6	36.4	1.2	22493.3	0	113.6	604.7	342.6	10.7	51.5	-277.4	3
40	20	1.6	0.3	0.1	20	80	BB	BB	20	Elec	115.4	38.2	1.3	22844.5	0	115.4	647.5	323.9	10.1	48.8	-258.7	3
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	399.8	12.5	58.1	-334.6	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	399.8	12.5	129.2	-361.4	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	395.6	12.4	225	-366	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	395.6	12.4	58.1	-330.3	4

High-Rise MURB - Lowest ICC - CZ4 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.2	40	0	BB	BB	20	NG	145.4	66.4	6.6	119329.1	28.9	116.5	691.1	0.6	0	0.5	15.3	1
7	20	2.5	0.3	0.1	40	0	BB	BB	20	Elec	144.4	67.7	1.6	28602	0	144.4	680.4	1.2	0	0.2	-8.1	1
7	20	2.5	0.4	0.1	40	0	BB	BB	20	Elec	142.8	65.1	1.6	28281.7	0	142.8	685.6	1.2	0	0.2	-3.9	1
10	20	2.5	0.4	0.2	40	0	BB	BB	20	NG	145.9	66.8	6.6	119411.2	28.9	117	694.4	-0.2	0	-0.2	15.3	1
10	20	2.5	0.4	0.2	40	0	BB	BB	20	Elec	144.4	66.8	1.6	28595.9	0	144.4	694.4	-0.2	0	0	-6.6	1
10	20	2.5	0.3	0.1	40	0	BB	BB	20	NG	141.1	62.9	6.6	118458.7	28.9	112.1	649.2	1.2	0	1.1	22.3	1
7	20	2.5	0.4	0.1	40	0	BB	BB	20	NG	144.3	65.1	6.6	119097	28.9	115.4	685.6	1.2	0	1.1	16.7	1
7	20	2.5	0.3	0.1	40	0	BB	BB	20	NG	145.9	67.7	6.6	119417.3	28.9	117	680.4	1.2	0	1.1	13.9	1
10	20	2.5	0.4	0.1	40	0	BB	BB	20	NG	139.5	60.3	6.6	118147.9	28.9	110.6	654.3	1.2	0	1.1	25	1
10	40	2.5	0.4	0.2	40	0	BB	BB	20	Elec	144	66.4	1.6	28513.8	0	144	691.1	0.6	0	0.1	-6.3	1
10	20	2.5	0.3	0.1	40	60	BB	BB	20	Elec	117.9	40.5	1.3	23336.5	0	117.9	521.6	27.4	0.9	4.3	21.9	2
7	20	2.5	0.4	0.1	40	60	BB	BB	20	Elec	121.6	43.2	1.3	24085.1	0	121.6	554.7	27.4	0.9	4.3	15.4	2
10	20	2.5	0.4	0.2	40	60	BB	BB	20	Elec	122.9	44.7	1.4	24340.8	0	122.9	563.9	26	0.8	4.1	14.6	2
10	20	2.5	0.4	0.1	40	60	BB	BB	20	Elec	117.2	38.8	1.3	23215.3	0	117.2	524.5	27.4	0.9	4.3	23	2
10	40	2.5	0.4	0.2	40	60	BB	BB	20	NG	124	44.3	6.4	115077.1	28.9	95.1	560.6	26.7	0.8	20.6	26.2	2
7	20	2.5	0.4	0.1	40	60	BB	BB	20	NG	123.1	43.2	6.4	114900.5	28.9	94.2	554.7	27.4	0.9	20.9	27.1	2
10	20	2.5	0.3	0.1	40	60	BB	BB	20	NG	119.3	40.5	6.3	114151.9	28.9	90.4	521.6	27.4	0.9	20.3	33.6	2
10	20	2.5	0.4	0.2	40	60	BB	BB	20	NG	124.4	44.7	6.4	115156.2	28.9	95.5	563.9	26	0.8	20.1	26.3	2
10	40	2.5	0.4	0.2	40	60	BB	BB	20	Elec	122.5	44.3	1.3	24261.7	0	122.5	560.6	26.7	0.8	4.2	14.5	2
10	20	2.5	0.4	0.1	40	60	BB	BB	20	NG	118.7	38.8	6.3	114030.7	28.9	89.8	524.5	27.4	0.9	20.2	34.7	2
10	20	1.6	0.3	0.1	40	60	BB	BB	40	NG	100	27.9	4.9	87707.3	21.7	78.4	445.9	69.8	2.2	24.8	20.8	3
10	40	1.6	0.4	0.1	40	60	BB	BB	20	Elec	105.5	26.4	1.2	20885.1	0	105.5	444.7	66.9	2.1	10.2	3.8	3
10	20	1.6	0.3	0.1	40	60	BB	BB	20	NG	107.3	27.9	6.2	111770.3	28.9	78.4	445.9	66.1	2.1	44.6	15.6	3
10	40	1.6	0.3	0.1	40	60	BB	BB	20	Elec	105.4	27.5	1.2	20878	0	105.4	442.5	66.9	2.1	10.2	3.8	3
10	20	1.6	0.3	0.1	40	60	BB	BB	20	Elec	105.8	27.9	1.2	20955	0	105.8	445.9	66.1	2.1	10.1	4	3
10	40	1.6	0.3	0.1	40	60	BB	BB	20	NG	106.9	27.5	6.2	111693.4	28.9	78	442.5	66.9	2.1	45	15.5	3
10	40	1.6	0.4	0.1	40	60	BB	BB	20	NG	106.9	26.4	6.2	111700.4	28.9	78	444.7	66.9	2.1	45	15.5	3
10	20	1.6	0.4	0.1	40	60	BB	BB	40	NG	100.1	26.7	4.9	87712.5	21.7	78.4	448.1	69.8	2.2	24.8	20.8	3
10	20	1.6	0.4	0.1	40	60	BB	BB	20	NG	107.3	26.7	6.2	111775.6	28.9	78.4	448.1	66.1	2.1	44.6	15.6	3
10	20	1.6	0.4	0.1	40	60	BB	BB	20	Elec	105.9	26.7	1.2	20960.2	0	105.9	448.1	66.1	2.1	10.1	3.9	3
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	92.6	12	1	18327.5	0	92.6	320.2	231.1	7.2	34.6	-138.2	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	91.4	12.2	1	18101.9	0	91.4	320.1	231.1	7.2	34.6	-136.2	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	93.7	11.7	6.1	109077.1	28.9	64.8	316.8	231.9	7.2	142.2	-126.7	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	91.1	11.9	1	18033.7	0	91.1	316.7	231.9	7.2	34.7	-136.4	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	92.5	11.9	6	108849.1	28.9	63.6	316.7	231.9	7.2	141.1	-124.7	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	94	12	6.1	109142.8	28.9	65.1	320.2	231.1	7.2	142.1	-126.5	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	92.9	12.2	6.1	108917.3	28.9	64	320.1	231.1	7.2	141	-124.5	4
7	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	96.6	14.8	6.1	109655.4	28.9	67.7	350.8	231.9	7.2	145.1	-131.7	4
7	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	95.1	14.8	1	18840	0	95.1	350.8	231.9	7.2	34.9	-143.4	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	92.2	11.7	1	18261.7	0	92.2	316.8	231.9	7.2	34.7	-138.4	4

High-Rise MURB - Lowest ICC - CZ5 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	155.1	75.5	1.7	30705.9	0	155.1	905.6	1.7	0.1	0.3	-8.9	1
10	40	2.5	0.3	0.1	40	0	BB	BB	20	Elec	156.7	78.2	1.7	31027.7	0	156.7	900.3	1.7	0.1	0.3	-13.1	1
10	20	2.5	0.4	0.1	40	0	BB	BB	20	Elec	155.6	76	1.7	30810.6	0	155.6	909.8	0.9	0	0.1	-9.5	1
10	20	2.5	0.3	0.1	40	0	BB	BB	20	Elec	157.2	78.8	1.7	31133.6	0	157.2	904.5	0.9	0	0.1	-13.8	1
10	40	2.5	0.4	0.2	40	0	FC	Condensing	20	NG	186.2	85.4	19.9	357551.9	102.4	83.8	380.6	3.5	0.1	2.1	18.7	1
10	40	2.5	0.4	0.2	40	0	FC	Condensing	20	Elec	184.8	85.4	14.8	266736.5	73.5	111.3	380.6	3.5	0.1	0.5	7	1
10	20	2.5	0.3	0.1	40	0	BB	BB	20	NG	158.7	78.8	6.8	121949	28.9	129.8	904.5	0.9	0	0.9	19.2	1
10	20	2.5	0.4	0.1	40	0	BB	BB	20	NG	157	76	6.8	121626	28.9	128.1	909.8	0.9	0	0.8	22	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	NG	156.5	75.5	6.8	121521.3	28.9	127.6	905.6	1.7	0.1	1.5	22.2	1
10	40	2.5	0.3	0.1	40	0	BB	BB	20	NG	158.1	78.2	6.8	121843.1	28.9	129.2	900.3	1.7	0.1	1.5	19.4	1
10	40	1.6	0.4	0.2	40	60	BB	BB	20	NG	126.4	44.6	6.4	115556.3	28.9	97.5	727.1	62	1.9	43.5	13.8	2
10	40	2	0.4	0.1	40	60	BB	BB	40	Elec	117.6	44.1	1.3	23277.2	0	117.6	722.9	42.3	1.3	6.5	34.6	2
10	20	2	0.4	0.1	40	60	BB	BB	40	Elec	118.1	44.6	1.3	23377.5	0	118.1	727.2	41.6	1.3	6.4	34.4	2
10	40	1.6	0.4	0.2	40	60	BB	BB	20	Elec	124.9	44.6	1.4	24740.9	0	124.9	727.1	62	1.9	9.6	2.1	2
10	40	2	0.4	0.1	40	60	BB	BB	20	Elec	124.4	44.1	1.4	24636.4	0	124.4	722.9	38.8	1.2	6	26.3	2
10	20	2	0.4	0.1	40	60	BB	BB	20	Elec	124.9	44.6	1.4	24736.7	0	124.9	727.2	38	1.2	5.9	26.1	2
10	40	2	0.4	0.1	40	60	BB	BB	20	NG	125.9	44.1	6.4	115451.8	28.9	97	722.9	38.8	1.2	27.1	37.9	2
10	20	2	0.4	0.1	40	60	BB	BB	20	NG	126.4	44.6	6.4	115552.1	28.9	97.5	727.2	38	1.2	26.7	37.8	2
10	40	2	0.4	0.1	40	60	BB	BB	40	NG	118.6	44.1	5.1	91388.7	21.7	97	722.9	42.3	1.3	15.3	43.3	2
10	20	2	0.4	0.1	40	60	BB	BB	40	NG	119.1	44.6	5.1	91489	21.7	97.5	727.2	41.6	1.3	15.1	43.2	2
10	20	1.2	0.3	0.1	40	60	BB	BB	40	NG	107.3	33.5	5	89152	21.7	85.7	615.6	102.9	3.2	35.6	2.2	3
10	40	1.2	0.3	0.1	40	60	BB	BB	20	NG	114.1	33.1	6.3	113115.6	28.9	85.2	611.2	100.1	3.1	64.2	-3	3
10	20	1.2	0.4	0.1	40	60	BB	BB	20	NG	114.8	32.4	6.3	113250.7	28.9	85.8	621.3	99.4	3.1	64	-3.5	3
10	20	1.2	0.3	0.1	40	60	BB	BB	20	NG	114.6	33.5	6.3	113215.1	28.9	85.7	615.6	99.4	3.1	63.9	-3.2	3
10	40	1.2	0.4	0.1	40	60	BB	BB	20	NG	114.3	31.9	6.3	113153.4	28.9	85.4	616.9	100.1	3.1	64.3	-3.4	3
10	20	1.2	0.4	0.1	40	60	BB	BB	40	NG	107.5	32.4	5	89187.6	21.7	85.8	621.3	102.9	3.2	35.6	1.9	3
10	20	1.2	0.3	0.1	40	60	BB	BB	20	Elec	113.1	33.5	1.2	22399.7	0	113.1	615.6	99.4	3.1	15.1	-14.9	3
10	20	1.2	0.4	0.1	40	60	BB	BB	20	Elec	113.3	32.4	1.2	22435.3	0	113.3	621.3	99.4	3.1	15.1	-15.2	3
10	40	1.2	0.4	0.1	40	60	BB	BB	20	Elec	112.8	31.9	1.2	22338.1	0	112.8	616.9	100.1	3.1	15.2	-15.1	3
10	40	1.2	0.3	0.1	40	60	BB	BB	20	Elec	112.6	33.1	1.2	22300.2	0	112.6	611.2	100.1	3.1	15.2	-14.7	3
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	101.8	20	1.1	20156.6	0	101.8	519.3	220.1	6.9	32.7	-116	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	100.8	20.5	1.1	19968.2	0	100.8	513.8	220.1	6.9	32.7	-114.4	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	103.7	20.4	6.2	111062.4	28.9	74.8	523.7	219.3	6.9	131	-104.4	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	103.2	20	6.2	110971.9	28.9	74.3	519.3	220.1	6.9	131.1	-104.3	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	102.3	20.4	1.1	20247	0	102.3	523.7	219.3	6.9	32.6	-116.1	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	101.3	20.9	1.1	20061.3	0	101.3	518.3	219.3	6.9	32.6	-114.4	4
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	96.5	20.4	4.8	86999.3	21.7	74.8	523.7	222.9	7	74	-99	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	102.8	20.9	6.2	110876.6	28.9	73.9	518.3	219.3	6.9	130.2	-102.8	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	102.3	20.5	6.2	110783.6	28.9	73.4	513.8	220.1	6.9	130.2	-102.7	4
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	95.5	20.9	4.8	86813.5	21.7	73.9	518.3	222.9	7	73.8	-97.4	4

High-Rise MURB - Lowest ICC - CZ6 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	207	115.1	18.8	338691.4	95	112	452.3	9	0.3	1.1	1.7	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	185.9	108.8	2	36818.6	0	185.9	1150.2	5.1	0.2	0.8	-24.7	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	20	NG	210.2	119.5	25.2	453743.9	131.6	78.6	437.6	8.1	0.3	5.5	15.1	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	207.9	118.7	20	360790.9	102	105.9	436.6	9	0.3	1.4	3.7	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	20	NG	209.4	118.7	25.1	451606.2	131	78.4	436.6	9	0.3	5.7	15.3	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	NG	187.4	108.8	7.1	127634	28.9	158.5	1150.2	5.1	0.2	4.9	10.6	1
10	40	2.5	0.4	0.1	40	0	FC	Condensing	20	NG	208.5	115.1	23.9	429506.8	124	84.5	452.3	9	0.3	3.2	13.4	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	208.7	119.5	20.2	362928.5	102.7	106.1	437.6	8.1	0.3	1.2	3.5	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	207.8	115.9	18.9	340792.5	95.7	112.2	453.3	8.1	0.3	1	1.6	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	20	NG	209.3	115.9	24	431607.8	124.6	84.7	453.3	8.1	0.3	3	13.3	1
10	20	1.2	0.4	0.1	40	60	BB	BB	40	Elec	121.7	50	1.3	24096.9	0	121.7	842.9	127.7	4	18.8	9.5	2
10	40	1.2	0.4	0.1	40	60	BB	BB	20	Elec	127.9	49.3	1.4	25324.8	0	127.9	836.7	124.3	3.9	18.5	2.2	2
10	20	1.2	0.4	0.1	40	60	BB	BB	20	Elec	128.6	50	1.4	25456.1	0	128.6	842.9	123.4	3.9	18.4	2	2
10	40	1.2	0.4	0.1	40	60	BB	BB	40	Elec	121	49.3	1.3	23965.6	0	121	836.7	128.6	4	18.9	9.8	2
10	20	1.6	0.4	0.1	40	80	BB	BB	20	NG	129.7	49.7	6.5	116206.4	28.9	100.8	868.8	129.7	4.1	77.4	8	2
10	20	1.6	0.4	0.1	40	80	BB	BB	20	Elec	128.2	49.7	1.4	25391.1	0	128.2	868.8	129.7	4.1	19.3	-3.7	2
10	40	1.2	0.4	0.1	40	60	BB	BB	40	NG	122.1	49.3	5.1	92077.1	21.7	100.4	836.7	128.6	4	42.6	18.5	2
10	20	1.2	0.4	0.1	40	60	BB	BB	40	NG	122.8	50	5.1	92208.4	21.7	101.1	842.9	127.7	4	42.4	18.3	2
10	20	1.2	0.4	0.1	40	60	BB	BB	20	NG	130	50	6.5	116271.5	28.9	101.1	842.9	123.4	3.9	73.8	13.6	2
10	40	1.2	0.4	0.1	40	60	BB	BB	20	NG	129.3	49.3	6.5	116140.2	28.9	100.4	836.7	124.3	3.9	74	13.9	2
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	107	33.2	4.9	89082.4	21.7	85.3	734.1	272.9	8.5	85.8	-99.7	3
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	112.1	33.9	1.2	22204.6	0	112.1	724.4	268.7	8.4	38.9	-114.9	3
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	112.8	33.2	1.2	22330.2	0	112.8	734.1	268.7	8.4	39	-116	3
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	106.4	33.9	4.9	88956.9	21.7	84.7	724.4	272.9	8.5	85.6	-98.6	3
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	111.5	33.2	1.2	22077.5	0	111.5	718.2	269.6	8.4	39	-114.7	3
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	112.2	32.6	1.2	22206.8	0	112.2	727.8	269.6	8.4	39.1	-115.8	3
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	113.6	33.9	6.3	113020	28.9	84.7	724.4	268.7	8.4	145	-103.2	3
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	114.2	33.2	6.3	113145.5	28.9	85.3	734.1	268.7	8.4	145.5	-104.3	3
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	112.9	33.2	6.3	112892.8	28.9	84	718.2	269.6	8.4	144.9	-103	3
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	113.6	32.6	6.3	113022.2	28.9	84.7	727.8	269.6	8.4	145.5	-104.2	3
40	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	94.3	21.4	4.8	86576.9	21.7	72.7	598.4	469.1	14.7	141.2	-274	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	93.3	21.4	1	18465.4	0	93.3	598.4	469.1	14.7	66	-282.8	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	101.6	21.4	6.1	110640	28.9	72.7	598.4	464.9	14.5	234.2	-278.7	4
40	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	95.7	21.5	4.8	86854.1	21.7	74.1	607.4	469.1	14.7	141.9	-276.5	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	101.5	21.5	1.1	20101.8	0	101.5	607.4	464.9	14.5	66.3	-292.8	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	100.1	21.4	1.1	19824.7	0	100.1	598.4	464.9	14.5	66.1	-290.4	4
40	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	94.7	21.5	1	18742.6	0	94.7	607.4	469.1	14.7	66.2	-285.2	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	103	21.5	6.2	110917.2	28.9	74.1	607.4	464.9	14.5	236	-281.1	4
20	20	0.8	0.3	0.01	40	80	BB	BB	20	NG	100.9	20.3	6.1	110498.2	28.9	71.9	582.8	465.2	14.5	233.4	-277.8	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	101.6	21.4	6.1	110640	28.9	72.7	598.4	464.9	14.5	234.2	-278.7	4

High-Rise MURB - Lowest ICC - CZ7a - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	40	60	FC	Condensing	20	NG	190.5	108.7	19.8	355882.5	101.6	88.9	484	26.4	0.8	24.2	-9.5	1
10	20	2	0.4	0.1	40	60	FC	Condensing	20	Elec	190.5	106.9	13.8	247904.4	67.1	123.4	501.3	26.4	0.8	3.7	-26.4	1
10	20	2	0.3	0.1	40	60	FC	Condensing	20	Elec	189	108.7	14.7	265067.1	72.7	116.4	484	26.4	0.8	4.3	-21.2	1
10	20	2	0.4	0.1	40	60	FC	Condensing	40	NG	184.7	106.9	17.5	314656.7	88.8	95.9	501.3	30.7	1	9.1	-10.1	1
10	20	2	0.3	0.1	40	60	FC	Condensing	40	NG	183.3	108.7	18.4	331819.4	94.4	88.9	484	30.7	1	12.6	-4.9	1
10	40	2	0.4	0.1	40	60	FC	Condensing	20	NG	191.1	106.1	18.7	336410.2	95.3	95.8	500.4	27.3	0.9	12.6	-14.5	1
10	40	2	0.3	0.1	40	60	FC	Condensing	20	NG	189.6	107.8	19.6	353520.8	100.9	88.8	483.1	27.3	0.9	22.3	-9.3	1
10	20	2	0.4	0.1	40	60	FC	Condensing	20	NG	191.9	106.9	18.8	338719.7	96	95.9	501.3	26.4	0.8	12.9	-14.7	1
10	40	2	0.3	0.1	40	60	FC	Condensing	20	Elec	188.2	107.8	14.6	262705.4	72	116.2	483.1	27.3	0.9	4.4	-21	1
10	40	2	0.4	0.1	40	60	FC	Condensing	20	Elec	189.6	106.1	13.6	245594.8	66.4	123.2	500.4	27.3	0.9	3.8	-26.2	1
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	124.4	50.2	5.1	92536.6	21.7	102.8	787.9	246.4	7.7	89.1	-207.9	2
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	131	50.9	6.5	116474	28.9	102.1	778.6	242.1	7.6	168.8	-212.6	2
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	129.6	50.9	1.4	25658.7	0	129.6	778.6	242.1	7.6	37.4	-176.9	2
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	130.2	50.2	1.4	25784.3	0	130.2	787.9	242.1	7.6	37.4	-176.9	2
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	128.9	50.2	1.4	25517.7	0	128.9	773.6	243	7.6	37.5	-177.8	2
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	129.5	49.5	1.4	25647.1	0	129.5	782.9	243	7.6	37.5	-177.8	2
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	131.7	50.2	6.5	116599.7	28.9	102.8	787.9	242.1	7.6	169.7	-212.6	2
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	130.3	50.2	6.5	116333.1	28.9	101.4	773.6	243	7.6	168.5	-213.5	2
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	131	49.5	6.5	116462.5	28.9	102.1	782.9	243	7.6	169.4	-213.5	2
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	123.8	50.9	5.1	92411	21.7	102.1	778.6	246.4	7.7	88.9	-207.9	2
40	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	116.5	36	6.3	113603.2	28.9	87.6	650.3	433.2	13.5	271.9	-403.7	3
40	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	117.8	35.9	6.3	113861.9	28.9	88.9	657.5	433.2	13.5	274.3	-403.7	3
40	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	109.3	36	5	89540.1	21.7	87.6	650.3	437.5	13.7	149.3	-399	3
40	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	117.2	35.3	6.3	113731.4	28.9	88.3	652.4	434.1	13.6	273.6	-404.6	3
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	114.4	35.4	1.3	22653.1	0	114.4	645.3	434.1	13.6	65.3	-368.9	3
40	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	116.4	35.9	1.3	23046.5	0	116.4	657.5	433.2	13.5	65.4	-368	3
40	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	115.1	36	1.3	22787.8	0	115.1	650.3	433.2	13.5	65.3	-368	3
40	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	110.6	35.9	5	89798.8	21.7	88.9	657.5	437.5	13.7	150	-399	3
40	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	115.9	35.4	6.3	113468.5	28.9	86.9	645.3	434.1	13.6	271.1	-404.6	3
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	115.7	35.3	1.3	22916	0	115.7	652.4	434.1	13.6	65.5	-368.9	3

High-Rise MURB - Highest NPV - CZ4 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.1	40	60	BB	BB	40	NG	116.6	45	5.1	90980.4	21.7	94.9	551.6	31.1	1	11.8	31.1	1
10	40	2	0.3	0.1	40	0	FC	Condensing	40	NG	140.2	54.8	13.7	246135.3	69.7	70.5	339.1	21.9	0.7	3.7	32	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	20	NG	155.8	62.8	16.7	300228.4	86	69.8	337.8	4.5	0.1	1.6	30.4	1
10	20	2.5	0.3	0.1	40	60	FC	Condensing	20	NG	133.7	41.5	12.3	221945.5	62.4	71.3	335.9	30.7	1	4.2	30.8	1
10	40	2.5	0.4	0.1	40	0	FC	Condensing	40	NG	148.8	59.4	14.4	259982.1	73.6	75.2	367.7	9	0.3	1.8	31.9	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	40	NG	149.2	59.8	14.5	261250.1	74	75.3	364.3	8.2	0.3	1.6	32.1	1
10	20	2	0.3	0.1	40	0	FC	Condensing	40	NG	140.6	55.2	13.7	247421.9	70.1	70.5	339.8	21.1	0.7	3.6	32.1	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	40	NG	148.1	62.3	15.3	274877	78.4	69.7	337.1	9	0.3	2.1	35.5	1
10	40	2.5	0.3	0.1	40	60	FC	Condensing	20	NG	133.2	41	12.3	220718.8	62	71.2	335.1	31.5	1	4.3	30.7	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	40	NG	148.6	62.8	15.3	276165.4	78.8	69.8	337.8	8.2	0.3	1.9	35.6	1
10	40	2	0.4	0.1	40	60	BB	BB	40	NG	104.7	31.7	4.9	88626.3	21.7	83	480.3	44.8	1.4	16.2	37.9	2
10	40	2	0.3	0.1	40	60	BB	BB	40	NG	105	33.1	4.9	88678.6	21.7	83.3	477.7	44.8	1.4	16.2	37.4	2
10	40	2.5	0.3	0.1	40	60	FC	Condensing	40	NG	126	41	10.9	196655.7	54.8	71.2	335.1	35.2	1.1	4.1	35.9	2
10	40	2.5	0.3	0.1	40	60	BB	BB	40	NG	111.7	40.1	5	90009.6	21.7	90	518.3	31.9	1	11.8	38.7	2
10	20	2.5	0.3	0.1	40	60	FC	Condensing	40	NG	126.4	41.5	11	197882.4	55.2	71.3	335.9	34.4	1.1	4	36	2
10	20	2	0.3	0.1	40	60	BB	BB	40	NG	105.3	33.5	4.9	88756.8	21.7	83.7	481	44	1.4	15.9	37.5	2
10	20	2.5	0.4	0.1	40	60	BB	BB	40	NG	111.5	38.8	5	89967.6	21.7	89.8	524.5	31.1	1	11.5	39.9	2
10	20	2.5	0.3	0.1	40	60	BB	BB	40	NG	112.1	40.5	5	90088.8	21.7	90.4	521.6	31.1	1	11.6	38.8	2
10	40	2.5	0.4	0.1	40	60	BB	BB	40	NG	111.1	38.4	5	89889.8	21.7	89.4	521.2	31.9	1	11.8	39.8	2
10	20	2	0.4	0.1	40	60	BB	BB	40	NG	105.1	32.1	4.9	88702.8	21.7	83.4	483.6	44	1.4	15.9	38	2
10	20	1.6	0.3	0.1	40	60	BB	BB	20	NG	107.3	27.9	6.2	111770.3	28.9	78.4	445.9	66.1	2.1	44.6	15.6	3
10	20	1.6	0.4	0.1	40	60	BB	BB	40	Elec	99	26.7	1.1	19601	0	99	448.1	69.8	2.2	10.6	12	3
10	20	1.6	0.4	0.1	40	60	BB	BB	20	NG	107.3	26.7	6.2	111775.6	28.9	78.4	448.1	66.1	2.1	44.6	15.6	3
10	40	1.6	0.3	0.1	40	60	BB	BB	20	NG	106.9	27.5	6.2	111693.4	28.9	78	442.5	66.9	2.1	45	15.5	3
10	40	1.6	0.4	0.1	40	60	BB	BB	20	NG	106.9	26.4	6.2	111700.4	28.9	78	444.7	66.9	2.1	45	15.5	3
10	20	1.6	0.3	0.1	40	60	BB	BB	40	NG	100	27.9	4.9	87707.3	21.7	78.4	445.9	69.8	2.2	24.8	20.8	3
10	20	1.6	0.4	0.1	40	60	BB	BB	40	NG	100.1	26.7	4.9	87712.5	21.7	78.4	448.1	69.8	2.2	24.8	20.8	3
10	40	1.6	0.3	0.1	40	60	BB	BB	40	NG	99.7	27.5	4.9	87630.3	21.7	78	442.5	70.6	2.2	25	20.7	3
10	40	1.6	0.4	0.1	40	60	BB	BB	40	NG	99.7	26.4	4.9	87637.4	21.7	78	444.7	70.6	2.2	25	20.7	3
10	20	1.6	0.3	0.1	40	60	BB	BB	40	Elec	99	27.9	1.1	19595.7	0	99	445.9	69.8	2.2	10.6	12.1	3
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	86.8	12	4.7	85079.7	21.7	65.1	320.2	234.8	7.3	79.2	-121.3	4
10	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	84.6	12.2	0.9	16742.7	0	84.6	320.1	234.8	7.3	34.7	-128.1	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	93.7	11.7	6.1	109077.1	28.9	64.8	316.8	231.9	7.2	142.2	-126.7	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	92.5	11.9	6	108849.1	28.9	63.6	316.7	231.9	7.2	141.1	-124.7	4
10	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	85.3	11.9	4.7	84786	21.7	63.6	316.7	235.6	7.4	79.1	-119.5	4
10	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	86.4	11.7	4.7	85014	21.7	64.8	316.8	235.6	7.4	79.4	-121.5	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	94	12	6.1	109142.8	28.9	65.1	320.2	231.1	7.2	142.1	-126.5	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	92.9	12.2	6.1	108917.3	28.9	64	320.1	231.1	7.2	141	-124.5	4
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	85.6	12.2	4.7	84854.2	21.7	64	320.1	234.8	7.3	78.9	-119.3	4
7	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	89.4	14.8	4.8	85592.3	21.7	67.7	350.8	235.6	7.4	80.3	-126.5	4

High-Rise MURB - Highest NPV - CZ5 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.3	0.1	40	60	BB	BB	40	NG	126.5	53.4	5.2	92954.3	21.7	104.9	779	30	0.9	11.2	42	1
10	20	2.5	0.3	0.1	40	60	FC	Condensing	40	NG	145.6	57.9	13.1	236100.9	66.2	79.4	368.6	32.5	1	3.8	42.1	1
10	20	2	0.3	0.1	40	60	BB	BB	40	NG	119.6	46.2	5.1	91578.3	21.7	97.9	721.8	41.6	1.3	15.1	42.4	1
10	20	2.5	0.4	0.1	40	60	BB	BB	40	NG	126.3	52	5.2	92904.6	21.7	104.6	788.6	29.3	0.9	10.9	43.1	1
10	20	2.5	0.3	0.1	40	60	BB	BB	40	NG	127.1	53.9	5.2	93057.3	21.7	105.4	783.3	29.3	0.9	11	41.8	1
10	20	2	0.3	0.1	40	60	FC	Condensing	40	NG	137.9	50.6	11.6	208484	57.8	80	368.8	44.7	1.4	4.5	39	1
10	40	2.5	0.3	0.1	40	60	FC	Condensing	40	NG	145	57.3	13	234602	65.7	79.3	367.7	33.2	1	3.9	42.1	1
10	40	2	0.3	0.1	40	60	FC	Condensing	40	NG	137.3	50	11.5	207006.4	57.4	79.9	367.9	45.5	1.4	4.5	39.1	1
10	40	2.5	0.4	0.1	40	60	BB	BB	40	NG	125.8	51.5	5.2	92803.2	21.7	104.1	784.4	30	0.9	11.2	43.3	1
10	40	2	0.3	0.1	40	60	BB	BB	40	NG	119.1	45.8	5.1	91476.1	21.7	97.4	717.5	42.3	1.3	15.3	42.6	1
10	40	2	0.4	0.1	40	60	BB	BB	40	Elec	117.6	44.1	1.3	23277.2	0	117.6	722.9	42.3	1.3	6.5	34.6	2
10	20	2	0.4	0.1	40	60	BB	BB	40	Elec	118.1	44.6	1.3	23377.5	0	118.1	727.2	41.6	1.3	6.4	34.4	2
10	40	1.6	0.4	0.1	40	60	BB	BB	40	NG	112.8	38	5	90240.5	21.7	91.2	671.2	66.8	2.1	23.6	28.8	2
10	20	2	0.4	0.1	40	60	BB	BB	20	NG	126.4	44.6	6.4	115552.1	28.9	97.5	727.2	38	1.2	26.7	37.8	2
10	40	1.6	0.3	0.1	40	60	BB	BB	40	NG	113	39.4	5	90269.9	21.7	91.3	665.6	66.8	2.1	23.6	28.5	2
10	40	2	0.4	0.1	40	60	BB	BB	20	NG	125.9	44.1	6.4	115451.8	28.9	97	722.9	38.8	1.2	27.1	37.9	2
10	20	2	0.4	0.1	40	60	BB	BB	40	NG	119.1	44.6	5.1	91489	21.7	97.5	727.2	41.6	1.3	15.1	43.2	2
10	20	1.6	0.3	0.1	40	60	BB	BB	40	NG	113.5	39.9	5	90370.9	21.7	91.8	670	66.1	2.1	23.4	28.4	2
10	20	1.6	0.4	0.1	40	60	BB	BB	40	NG	113.3	38.5	5	90339.5	21.7	91.7	675.5	66.1	2.1	23.4	28.7	2
10	40	2	0.4	0.1	40	60	BB	BB	40	NG	118.6	44.1	5.1	91388.7	21.7	97	722.9	42.3	1.3	15.3	43.3	2
10	20	1.2	0.3	0.1	40	60	BB	BB	20	NG	114.6	33.5	6.3	113215.1	28.9	85.7	615.6	99.4	3.1	63.9	-3.2	3
10	40	1.2	0.3	0.1	40	60	BB	BB	20	NG	114.1	33.1	6.3	113115.6	28.9	85.2	611.2	100.1	3.1	64.2	-3	3
10	20	1.6	0.3	0.1	40	80	BB	BB	40	NG	106.7	32.8	4.9	89014.9	21.7	85	629.5	108.1	3.4	37.3	-1.7	3
10	20	1.2	0.3	0.1	40	60	BB	BB	40	NG	107.3	33.5	5	89152	21.7	85.7	615.6	102.9	3.2	35.6	2.2	3
10	20	1.6	0.4	0.1	40	80	BB	BB	40	NG	106.9	31.7	4.9	89054.9	21.7	85.2	635.1	108.1	3.4	37.3	-2.1	3
10	20	1.2	0.4	0.1	40	60	BB	BB	40	NG	107.5	32.4	5	89187.6	21.7	85.8	621.3	102.9	3.2	35.6	1.9	3
10	40	1.2	0.4	0.1	40	60	BB	BB	40	NG	107	31.9	4.9	89090.3	21.7	85.4	616.9	103.6	3.2	35.8	2	3
10	40	1.2	0.3	0.1	40	60	BB	BB	40	NG	106.8	33.1	4.9	89052.5	21.7	85.2	611.2	103.6	3.2	35.8	2.4	3
10	40	1.6	0.4	0.1	40	80	BB	BB	40	NG	106.4	31.2	4.9	88958.6	21.7	84.7	630.7	108.8	3.4	37.5	-2	3
10	40	1.6	0.3	0.1	40	80	BB	BB	40	NG	106.2	32.3	4.9	88916.5	21.7	84.5	625.2	108.8	3.4	37.5	-1.6	3
10	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	94	20.5	1	18609	0	94	513.8	223.6	7	32.8	-106	4
10	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	96	20	4.8	86908.9	21.7	74.3	519.3	223.6	7	74.1	-98.9	4
10	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	95.1	20.5	4.8	86720.5	21.7	73.4	513.8	223.6	7	73.9	-97.3	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	103.2	20	6.2	110971.9	28.9	74.3	519.3	220.1	6.9	131.1	-104.3	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	102.3	20.5	6.2	110783.6	28.9	73.4	513.8	220.1	6.9	130.2	-102.7	4
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	95.5	20.9	4.8	86813.5	21.7	73.9	518.3	222.9	7	73.8	-97.4	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	103.7	20.4	6.2	111062.4	28.9	74.8	523.7	219.3	6.9	131	-104.4	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	102.8	20.9	6.2	110876.6	28.9	73.9	518.3	219.3	6.9	130.2	-102.8	4
10	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	94.5	20.9	1	18702	0	94.5	518.3	222.9	7	32.7	-106.1	4
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	96.5	20.4	4.8	86999.3	21.7	74.8	523.7	222.9	7	74	-99	4

High-Rise MURB - Highest NPV - CZ6 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	40	60	BB	BB	40	NG	149.3	77.5	5.4	97465.7	21.7	127.7	1032.8	39.5	1.2	14.5	60.7	1
10	20	2	0.4	0.1	40	60	BB	BB	20	NG	146.9	67.5	6.6	119619.1	28.9	118	968.6	49.2	1.5	33.1	58.7	1
10	20	2.5	0.3	0.1	40	60	BB	BB	40	NG	151.6	80.6	5.4	97916.8	21.7	129.9	1029.1	38.6	1.2	14.3	57.6	1
10	40	2	0.4	0.1	40	60	BB	BB	20	NG	146.2	66.8	6.6	119485.1	28.9	117.3	962.5	50.1	1.6	33.5	59	1
10	20	2.5	0.4	0.1	40	60	BB	BB	40	NG	150	78.1	5.4	97600.4	21.7	128.3	1038.9	38.6	1.2	14.3	60.4	1
10	20	2	0.3	0.1	40	60	BB	BB	40	NG	140.9	69.7	5.3	95792.6	21.7	119.2	958.8	53.5	1.7	19	61.3	1
10	20	2	0.4	0.1	40	60	BB	BB	40	NG	139.7	67.5	5.3	95556	21.7	118	968.6	53.5	1.7	18.9	63.4	1
10	40	2	0.4	0.1	40	60	BB	BB	40	NG	139	66.8	5.3	95422	21.7	117.3	962.5	54.4	1.7	19.2	63.6	1
10	40	2	0.3	0.1	40	60	BB	BB	40	NG	140.2	69	5.3	95656.3	21.7	118.5	952.8	54.4	1.7	19.3	61.6	1
10	40	2.5	0.3	0.1	40	60	BB	BB	40	NG	150.9	80	5.4	97780.1	21.7	129.2	1023	39.5	1.2	14.6	57.9	1
10	40	1.2	0.4	0.1	40	60	BB	BB	40	Elec	121	49.3	1.3	23965.6	0	121	836.7	128.6	4	18.9	9.8	2
10	40	1.2	0.4	0.1	40	60	BB	BB	40	NG	122.1	49.3	5.1	92077.1	21.7	100.4	836.7	128.6	4	42.6	18.5	2
10	40	1.6	0.4	0.1	40	80	BB	BB	40	NG	121.8	49	5.1	92013.2	21.7	100.1	862.6	134.8	4.2	44.7	12.9	2
10	20	1.2	0.4	0.1	40	60	BB	BB	40	Elec	121.7	50	1.3	24096.9	0	121.7	842.9	127.7	4	18.8	9.5	2
10	20	1.2	0.4	0.1	40	60	BB	BB	20	NG	130	50	6.5	116271.5	28.9	101.1	842.9	123.4	3.9	73.8	13.6	2
10	20	1.2	0.4	0.1	40	60	BB	BB	40	NG	122.8	50	5.1	92208.4	21.7	101.1	842.9	127.7	4	42.4	18.3	2
10	20	1.6	0.4	0.1	40	80	BB	BB	40	NG	122.5	49.7	5.1	92143.3	21.7	100.8	868.8	133.9	4.2	44.5	12.6	2
10	40	1.2	0.4	0.1	40	60	BB	BB	20	NG	129.3	49.3	6.5	116140.2	28.9	100.4	836.7	124.3	3.9	74	13.9	2
10	20	1.6	0.4	0.1	40	80	BB	BB	20	NG	129.7	49.7	6.5	116206.4	28.9	100.8	868.8	129.7	4.1	77.4	8	2
10	40	1.6	0.4	0.1	40	80	BB	BB	20	NG	129	49	6.4	116076.2	28.9	100.1	862.6	130.6	4.1	77.6	8.2	2
10	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	105.3	33.9	1.2	20845.4	0	105.3	724.4	272.9	8.5	39.1	-107.4	3
10	20	0.8	0.4	0.1	40	80	BB	BB	20	NG	114.2	33.2	6.3	113145.5	28.9	85.3	734.1	268.7	8.4	145.5	-104.3	3
10	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	104.6	33.2	1.2	20718.2	0	104.6	718.2	273.8	8.6	39.2	-107.1	3
10	20	0.8	0.3	0.1	40	80	BB	BB	20	NG	113.6	33.9	6.3	113020	28.9	84.7	724.4	268.7	8.4	145	-103.2	3
10	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	113.6	32.6	6.3	113022.2	28.9	84.7	727.8	269.6	8.4	145.5	-104.2	3
10	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	106.4	32.6	4.9	88959.1	21.7	84.7	727.8	273.8	8.6	85.8	-99.5	3
10	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	112.9	33.2	6.3	112892.8	28.9	84	718.2	269.6	8.4	144.9	-103	3
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	107	33.2	4.9	89082.4	21.7	85.3	734.1	272.9	8.5	85.8	-99.7	3
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	106.4	33.9	4.9	88956.9	21.7	84.7	724.4	272.9	8.5	85.6	-98.6	3
10	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	105.7	33.2	4.9	88829.8	21.7	84	718.2	273.8	8.6	85.7	-98.4	3
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	100.1	21.4	1.1	19824.7	0	100.1	598.4	464.9	14.5	66.1	-290.4	4
40	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	95.7	21.5	4.8	86854.1	21.7	74.1	607.4	469.1	14.7	141.9	-276.5	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	94.3	21.4	4.8	86576.9	21.7	72.7	598.4	469.1	14.7	141.2	-274	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	93.3	21.4	1	18465.4	0	93.3	598.4	469.1	14.7	66	-282.8	4
40	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	94.7	21.5	1	18742.6	0	94.7	607.4	469.1	14.7	66.2	-285.2	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	103	21.5	6.2	110917.2	28.9	74.1	607.4	464.9	14.5	236	-281.1	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	101.6	21.4	6.1	110640	28.9	72.7	598.4	464.9	14.5	234.2	-278.7	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	101.5	21.5	1.1	20101.8	0	101.5	607.4	464.9	14.5	66.3	-292.8	4
40	40	0.8	0.4	0.01	40	80	BB	BB	40	NG	92	17	4.8	86111.4	21.7	70.3	538.9	470.4	14.7	140.5	-271.3	4
40	20	0.8	0.3	0.01	40	80	BB	BB	20	NG	97.8	17.1	6.1	109899.2	28.9	68.9	536.8	465.2	14.5	229.6	-272.6	4

High-Rise MURB - Highest NPV - CZ7a - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	40	60	FC	Condensing	20	NG	190.5	108.7	19.8	355882.5	101.6	88.9	484	26.4	0.8	24.2	-9.5	1
10	20	2	0.4	0.1	40	60	FC	Condensing	20	NG	191.9	106.9	18.8	338719.7	96	95.9	501.3	26.4	0.8	12.9	-14.7	1
10	40	2	0.3	0.1	40	60	FC	Condensing	20	NG	189.6	107.8	19.6	353520.8	100.9	88.8	483.1	27.3	0.9	22.3	-9.3	1
10	20	2	0.3	0.1	40	60	FC	Condensing	40	NG	183.3	108.7	18.4	331819.4	94.4	88.9	484	30.7	1	12.6	-4.9	1
10	20	2	0.4	0.1	40	60	FC	Condensing	40	NG	184.7	106.9	17.5	314656.7	88.8	95.9	501.3	30.7	1	9.1	-10.1	1
10	40	2	0.3	0.1	40	60	FC	Condensing	40	NG	182.4	107.8	18.3	329457.7	93.7	88.8	483.1	31.6	1	12.3	-4.7	1
10	40	2	0.4	0.1	40	60	FC	Condensing	40	NG	183.9	106.1	17.4	312347.1	88.1	95.8	500.4	31.6	1	9	-9.9	1
10	40	2	0.4	0.1	40	60	FC	Condensing	20	NG	191.1	106.1	18.7	336410.2	95.3	95.8	500.4	27.3	0.9	12.6	-14.5	1
10	20	2	0.3	0.1	40	60	FC	Condensing	40	Elec	182.2	108.7	14.6	263707.9	72.7	109.5	484	30.7	1	4.9	-13.6	1
10	40	2	0.3	0.1	40	60	FC	Condensing	40	Elec	181.3	107.8	14.5	261346.2	72	109.4	483.1	31.6	1	5	-13.4	1
10	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	122.7	49.5	1.3	24287.9	0	122.7	782.9	247.2	7.7	37.7	-182	2
10	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	123.8	50.9	5.1	92411	21.7	102.1	778.6	246.4	7.7	88.9	-207.9	2
10	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	124.4	50.2	5.1	92536.6	21.7	102.8	787.9	246.4	7.7	89.1	-207.9	2
10	20	0.8	0.4	0.1	40	80	BB	BB	40	Elec	123.4	50.2	1.4	24425.1	0	123.4	787.9	246.4	7.7	37.6	-181.1	2
10	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	122.7	50.9	1.3	24299.4	0	122.7	778.6	246.4	7.7	37.6	-181.1	2
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	129.6	50.9	1.4	25658.7	0	129.6	778.6	242.1	7.6	37.4	-176.9	2
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	130.2	50.2	1.4	25784.3	0	130.2	787.9	242.1	7.6	37.4	-176.9	2
10	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	122	50.2	1.3	24158.5	0	122	773.6	247.2	7.7	37.7	-182	2
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	129.5	49.5	1.4	25647.1	0	129.5	782.9	243	7.6	37.5	-177.8	2
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	128.9	50.2	1.4	25517.7	0	128.9	773.6	243	7.6	37.5	-177.8	2
40	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	109.3	36	5	89540.1	21.7	87.6	650.3	437.5	13.7	149.3	-399	3
40	20	0.8	0.4	0.1	40	80	BB	BB	40	NG	110.6	35.9	5	89798.8	21.7	88.9	657.5	437.5	13.7	150	-399	3
40	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	108.2	36	1.2	21428.6	0	108.2	650.3	437.5	13.7	65.2	-372.2	3
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	114.4	35.4	1.3	22653.1	0	114.4	645.3	434.1	13.6	65.3	-368.9	3
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	115.7	35.3	1.3	22916	0	115.7	652.4	434.1	13.6	65.5	-368.9	3
40	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	108.9	35.3	1.2	21556.8	0	108.9	652.4	438.3	13.7	65.4	-373.1	3
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	107.5	35.4	1.2	21293.9	0	107.5	645.3	438.3	13.7	65.2	-373.1	3
40	20	0.8	0.4	0.1	40	80	BB	BB	40	Elec	109.5	35.9	1.2	21687.3	0	109.5	657.5	437.5	13.7	65.3	-372.2	3
40	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	116.4	35.9	1.3	23046.5	0	116.4	657.5	433.2	13.5	65.4	-368	3
40	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	115.1	36	1.3	22787.8	0	115.1	650.3	433.2	13.5	65.3	-368	3

High-Rise MURB - Lowest Cost of GHG Abatement - CZ4 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.4	0.2	40	0	BB	BB	20	Elec	144.4	66.8	1.6	28595.9	0	144.4	694.4	-0.2	0	0	-6.6	1
10	20	2.5	0.4	0.1	40	0	BB	BB	20	Elec	138	60.3	1.5	27332.5	0	138	654.3	1.2	0	0.2	8.5	1
10	40	2.5	0.3	0.1	40	0	BB	BB	20	Elec	139.2	62.5	1.5	27560.9	0	139.2	645.9	2	0.1	0.3	4.8	1
10	40	2.5	0.4	0.2	40	0	BB	BB	20	Elec	144	66.4	1.6	28513.8	0	144	691.1	0.6	0	0.1	-6.3	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	137.6	59.9	1.5	27251	0	137.6	650.9	2	0.1	0.3	8.8	1
7	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	142.4	64.7	1.6	28200.2	0	142.4	682.2	2	0.1	0.3	-3.6	1
7	20	2.5	0.4	0.1	40	0	BB	BB	20	Elec	142.8	65.1	1.6	28281.7	0	142.8	685.6	1.2	0	0.2	-3.9	1
7	20	2.5	0.3	0.1	40	0	BB	BB	20	Elec	144.4	67.7	1.6	28602	0	144.4	680.4	1.2	0	0.2	-8.1	1
10	20	2.5	0.4	0.2	40	0	BB	BB	20	NG	145.9	66.8	6.6	119411.2	28.9	117	694.4	-0.2	0	-0.2	15.3	1
10	20	2.5	0.3	0.1	40	0	BB	BB	20	Elec	139.6	62.9	1.5	27643.3	0	139.6	649.2	1.2	0	0.2	4.5	1
10	20	2.5	0.4	0.1	40	60	FC	Condensing	40	Elec	127.6	39.6	6.6	118888.7	29.9	97.7	366.3	34.4	1.1	2.7	21.7	2
10	40	2	0.4	0.1	40	60	FC	Condensing	40	Elec	121.1	33	5.2	93739.4	22.3	98.8	367.9	48.1	1.5	3.3	15.5	2
10	20	2.5	0.3	0.1	40	60	FC	Condensing	40	Elec	125.4	41.5	7.2	129770.9	33.5	91.9	335.9	34.4	1.1	2.8	27.3	2
10	20	2	0.4	0.1	40	60	FC	Condensing	40	Elec	121.5	33.4	5.3	94912.5	22.6	98.9	368.5	47.3	1.5	3.3	15.7	2
10	40	2	0.4	0.1	40	60	FC	Condensing	20	Elec	128	33	5.3	95098.6	22.3	105.7	367.9	44.4	1.4	3.1	7.3	2
10	20	2	0.3	0.1	40	60	FC	Condensing	20	Elec	125.6	34.8	5.9	105686.7	25.8	99.8	337	43.6	1.4	3.2	14	2
10	40	2	0.3	0.1	40	60	FC	Condensing	20	Elec	125.1	34.4	5.8	104476.2	25.4	99.7	343.2	44.4	1.4	3.2	13.8	2
10	20	2	0.4	0.1	40	60	FC	Condensing	20	Elec	128.4	33.4	5.3	96271.8	22.6	105.8	368.5	43.6	1.4	3.1	7.5	2
10	40	2.5	0.4	0.1	40	60	FC	Condensing	40	Elec	127.1	39.2	6.5	117695.2	29.5	97.6	365.7	35.2	1.1	2.7	21.5	2
10	40	2.5	0.3	0.1	40	60	FC	Condensing	40	Elec	124.9	41	7.1	128544.2	33.1	91.8	335.1	35.2	1.1	2.8	27.1	2
10	40	2	0.4	0.1	40	80	FC	Condensing	40	Elec	115.8	27.4	4.1	73085.8	16	99.8	367.4	92.3	2.9	5.9	-22.6	3
10	40	1.6	0.4	0.1	40	60	FC	Condensing	40	Elec	116.6	28.1	4.2	75277.8	16.7	99.9	370.4	73.9	2.3	4.8	-5.3	3
10	40	2	0.3	0.1	40	80	FC	Condensing	40	Elec	112.3	28.4	4.5	80820	18.7	93.6	342.8	92.3	2.9	6.1	-15.3	3
10	40	1.6	0.3	0.1	40	60	FC	Condensing	40	Elec	113.2	29.2	4.6	83342.6	19.5	93.7	345.9	73.9	2.3	4.9	1.9	3
10	40	2	0.3	0.1	40	80	FC	Condensing	20	Elec	119.2	28.4	4.6	82179.2	18.7	100.5	342.8	88.5	2.8	5.9	-23.5	3
10	20	1.6	0.3	0.1	40	60	FC	Condensing	40	Elec	113.6	29.7	4.7	84530.6	19.8	93.8	346.5	73.1	2.3	4.9	2.1	3
10	20	2	0.4	0.1	40	80	FC	Condensing	40	Elec	116.2	27.8	4.1	74217.4	16.3	99.9	367.9	91.5	2.9	5.9	-22.4	3
10	20	2	0.3	0.1	40	80	FC	Condensing	40	Elec	112.8	28.8	4.6	81987.2	19	93.7	336	91.5	2.9	6.1	-15.1	3
10	20	2	0.3	0.1	40	80	FC	Condensing	20	Elec	119.6	28.8	4.6	83346.4	19	100.6	336	87.8	2.7	5.9	-23.3	3
10	20	1.6	0.4	0.1	40	60	FC	Condensing	40	Elec	117	28.6	4.2	76424.9	17	100	370.9	73.1	2.3	4.8	-5.1	3
40	40	0.8	0.3	0.1	40	60	FC	Condensing	40	Elec	98.7	14.3	1.5	27617.9	2.6	96.1	330.6	369.1	11.5	20.5	-276.5	4
20	20	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	99.2	13.7	1.4	24330.2	1.5	97.7	343.8	412.5	12.9	22.6	-321.4	4
20	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	98.9	13.3	1.3	23421.8	1.2	97.7	339.1	413.2	12.9	22.6	-321.7	4
40	20	1.2	0.3	0.1	40	80	FC	Condensing	40	Elec	98.5	14.5	1.6	28084.2	2.7	95.8	331.1	330.3	10.3	18.3	-237.5	4
40	20	0.8	0.3	0.2	40	80	FC	Condensing	40	Elec	98.8	14.4	1.5	27415.9	2.5	96.3	331.9	411.1	12.8	22.8	-318.8	4
40	20	0.8	0.3	0.1	40	60	FC	Condensing	40	Elec	99	14.7	1.6	28613	2.9	96.2	332.4	368.3	11.5	20.5	-276.2	4
40	20	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	98.7	12.8	1.2	21589.5	0.7	98	327.6	412.5	12.9	22.4	-320.8	4
40	40	1.2	0.3	0.1	40	80	FC	Condensing	40	Elec	98.2	14.1	1.5	27106.9	2.4	95.7	322.4	331.1	10.3	18.3	-237.7	4
40	40	0.8	0.3	0.2	40	80	FC	Condensing	40	Elec	98.5	14	1.5	26452.2	2.2	96.2	324.2	411.9	12.9	22.7	-319.1	4
40	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	98.4	12.5	1.2	20765.6	0.4	98	323.5	413.2	12.9	22.4	-321.2	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ5 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	176.8	78.2	13.3	239327.7	65.2	111.5	380.5	4.8	0.2	0.6	15.4	1
10	40	2.5	0.4	0.2	40	0	FC	Condensing	20	Elec	184.8	85.4	14.8	266736.5	73.5	111.3	380.6	3.5	0.1	0.5	7	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	175.9	81.1	14.2	255253.5	70.4	105.5	367.8	4.8	0.2	0.7	19.5	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	177.4	78.8	13.4	240866.2	65.7	111.7	381.4	4.1	0.1	0.5	15.3	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	176.5	81.7	14.3	256813.4	70.8	105.7	368.7	4.1	0.1	0.6	19.4	1
7	20	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	183.8	83.9	14.4	259609.5	71.3	112.5	386.7	4.1	0.1	0.6	7	1
10	20	2.5	0.3	0.1	40	0	BB	BB	20	Elec	157.2	78.8	1.7	31133.6	0	157.2	904.5	0.9	0	0.1	-13.8	1
10	20	2.5	0.4	0.1	40	0	BB	BB	20	Elec	155.6	76	1.7	30810.6	0	155.6	909.8	0.9	0	0.1	-9.5	1
10	40	2.5	0.3	0.1	40	0	BB	BB	20	Elec	156.7	78.2	1.7	31027.7	0	156.7	900.3	1.7	0.1	0.3	-13.1	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	155.1	75.5	1.7	30705.9	0	155.1	905.6	1.7	0.1	0.3	-8.9	1
10	20	2	0.4	0.1	40	60	BB	BB	40	Elec	118.1	44.6	1.3	23377.5	0	118.1	727.2	41.6	1.3	6.4	34.4	2
10	20	2	0.3	0.1	40	80	FC	Condensing	40	Elec	129.7	43.7	6.4	114493.5	28.4	101.3	368.9	86.7	2.7	5.7	-3.2	2
10	20	1.2	0.3	0.1	40	60	FC	Condensing	40	Elec	124.5	38.7	5.3	95760.7	22.7	101.8	368.5	106.1	3.3	6.5	-16.4	2
10	40	1.2	0.4	0.1	40	60	FC	Condensing	40	Elec	127.8	37.4	4.8	85874.5	19.3	108.4	381.5	106.8	3.3	6.4	-24.5	2
10	40	2	0.4	0.1	40	60	BB	BB	20	Elec	124.4	44.1	1.4	24636.4	0	124.4	722.9	38.8	1.2	6	26.3	2
10	20	2	0.4	0.1	40	60	BB	BB	20	Elec	124.9	44.6	1.4	24736.7	0	124.9	727.2	38	1.2	5.9	26.1	2
10	40	1.2	0.3	0.1	40	60	FC	Condensing	40	Elec	123.9	38.2	5.2	94332.8	22.3	101.6	367.5	106.8	3.3	6.5	-16.4	2
10	40	2	0.3	0.1	40	80	FC	Condensing	40	Elec	129.1	43.1	6.3	113054.5	27.9	101.2	367.9	87.4	2.7	5.7	-3.2	2
10	40	2	0.4	0.1	40	60	BB	BB	40	Elec	117.6	44.1	1.3	23277.2	0	117.6	722.9	42.3	1.3	6.5	34.6	2
10	20	1.2	0.4	0.1	40	60	FC	Condensing	40	Elec	128.3	37.9	4.8	87253.8	19.7	108.6	382.5	106.1	3.3	6.3	-24.5	2
10	40	0.8	0.4	0.1	40	80	FC	Condensing	40	Elec	118.2	27	2.6	47119.1	7.6	110.7	390.7	226.8	7.1	12	-133.8	3
10	40	0.8	0.3	0.1	40	60	FC	Condensing	40	Elec	118.2	32.3	4	72216.5	15.6	102.6	368.4	184.8	5.8	10.5	-87.8	3
10	40	1.2	0.4	0.1	40	80	FC	ASHP	40	NG	117.1	31.8	5.7	103317.3	25.6	91.6	381.6	189	5.9	12	-85.3	3
10	20	1.2	0.4	0.1	40	80	FC	ASHP	40	NG	117.5	32.3	5.8	103749.1	25.7	91.8	382.5	188.3	5.9	11.9	-85.1	3
10	20	1.2	0.3	0.1	40	80	FC	ASHP	40	NG	111.8	32.7	5.8	104950.2	26.4	85.4	368.8	188.3	5.9	12	-75	3
10	40	1.2	0.3	0.1	40	80	FC	Condensing	40	NG	119	32.1	7.8	139901.3	37.1	81.9	367.9	148.7	4.6	10.8	-42.6	3
10	20	1.2	0.3	0.1	40	80	FC	Condensing	40	NG	119.6	32.7	7.8	141269.4	37.5	82.1	368.8	148	4.6	10.8	-42.7	3
10	40	1.2	0.3	0.1	40	80	FC	Condensing	40	Elec	118	32.1	4	71789.8	15.5	102.5	367.9	148.7	4.6	8.5	-51.4	3
10	20	0.8	0.3	0.1	40	60	FC	Condensing	40	Elec	118.7	32.9	4.1	73598.2	16	102.7	369.4	184.1	5.8	10.5	-87.8	3
10	20	1.2	0.3	0.1	40	80	FC	Condensing	40	Elec	118.5	32.7	4.1	73157.9	15.9	102.7	368.8	148	4.6	8.5	-51.4	3
40	20	0.8	0.3	0.1	40	80	FC	Condensing	40	NG	106.9	20.9	5.5	98868.9	24.8	82.1	364.9	389.5	12.2	24.3	-268.6	4
40	20	0.8	0.3	0.1	40	80	FC	ASHP	40	NG	105.4	20.9	5.1	91709.4	22.6	82.8	364.9	429.8	13.4	26.1	-307.4	4
40	40	0.8	0.3	0.1	40	80	FC	Condensing	40	NG	106.5	20.4	5.4	97673.1	24.5	82	364	390.3	12.2	24.2	-268.7	4
40	20	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	105.9	20.9	1.7	30757.4	3.1	102.7	364.9	389.5	12.2	19.6	-277.4	4
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	101.8	20	1.1	20156.6	0	101.8	519.3	220.1	6.9	32.7	-116	4
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	100.8	20.5	1.1	19968.2	0	100.8	513.8	220.1	6.9	32.7	-114.4	4
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	102.3	20.4	1.1	20247	0	102.3	523.7	219.3	6.9	32.6	-116.1	4
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	101.3	20.9	1.1	20061.3	0	101.3	518.3	219.3	6.9	32.6	-114.4	4
40	40	0.8	0.3	0.1	40	80	FC	ASHP	40	NG	105.1	20.4	5.1	91316	22.5	82.6	364	430.6	13.5	26.1	-307.6	4
40	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	105.4	20.4	1.6	29561.6	2.8	102.6	364	390.3	12.2	19.6	-277.4	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ6 - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	207	115.1	18.8	338691.4	95	112	452.3	9	0.3	1.1	1.7	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	207.9	118.7	20	360790.9	102	105.9	436.6	9	0.3	1.4	3.7	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	20	Elec	207.8	115.9	18.9	340792.5	95.7	112.2	453.3	8.1	0.3	1	1.6	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	20	Elec	208.7	119.5	20.2	362928.5	102.7	106.1	437.6	8.1	0.3	1.2	3.5	1
10	20	2.5	0.3	0.1	40	0	FC	Condensing	40	Elec	201.9	119.5	20.1	361569.3	102.7	99.2	437.6	12.4	0.4	1.9	11	1
10	40	2.5	0.4	0.1	40	0	BB	BB	40	Elec	179.1	108.8	2	35459.4	0	179.1	1150.2	9.4	0.3	1.5	-11.2	1
10	40	2.5	0.3	0.1	40	0	FC	Condensing	40	Elec	201.1	118.7	20	359431.6	102	99	436.6	13.2	0.4	2	11.2	1
10	40	2.5	0.4	0.1	40	0	FC	Condensing	40	Elec	200.2	115.1	18.7	337332.2	95	105.1	452.3	13.2	0.4	1.7	9.3	1
10	20	2.5	0.4	0.1	40	0	FC	Condensing	40	Elec	201	115.9	18.9	339433.2	95.7	105.3	453.3	12.4	0.4	1.6	9.1	1
10	40	2.5	0.4	0.1	40	0	BB	BB	20	Elec	185.9	108.8	2	36818.6	0	185.9	1150.2	5.1	0.2	0.8	-24.7	1
10	40	0.8	0.3	0.1	40	80	FC	Condensing	20	Elec	128.5	43.8	4.3	77357.6	16.6	111.9	441.3	273.4	8.5	12.2	-165.7	2
10	40	0.8	0.4	0.1	40	80	FC	Condensing	40	Elec	126.2	44	3.8	67973.7	13.7	112.5	457.6	277.7	8.7	12.1	-167.4	2
10	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	121.7	43.8	4.2	75998.4	16.6	105.1	441.3	277.7	8.7	12.4	-158.1	2
10	20	0.8	0.4	0.1	40	80	FC	Condensing	20	Elec	133.8	44.7	4	71123.6	14.3	119.5	458.6	272.5	8.5	12	-175	2
10	20	0.8	0.3	0.1	40	80	FC	Condensing	20	Elec	129.2	44.5	4.4	79228.2	17.1	112.1	442.3	272.5	8.5	12.2	-165.7	2
10	40	0.8	0.4	0.1	40	80	FC	Condensing	20	Elec	133.1	44	3.9	69332.9	13.7	119.4	457.6	273.4	8.5	12	-174.9	2
10	20	0.8	0.4	0.1	40	80	FC	Condensing	40	Elec	126.9	44.7	3.9	69764.4	14.3	112.7	458.6	276.8	8.6	12.1	-167.4	2
7	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	128.2	49.6	5.4	97099.2	22.9	105.3	443.1	277.7	8.7	13	-166.2	2
10	20	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	122.4	44.5	4.3	77868.9	17.1	105.2	442.3	276.8	8.6	12.4	-158.2	2
7	40	0.8	0.4	0.1	40	80	FC	Condensing	40	Elec	132.2	49.4	4.9	87612.7	19.6	112.6	459.3	277.7	8.7	12.7	-174.8	2
40	40	0.8	0.3	0.1	40	80	FC	Condensing	20	Elec	117.3	33.6	2.3	40981.7	5.7	111.6	436.9	468.7	14.6	19.2	-346.9	3
40	20	0.8	0.3	0.1	40	80	FC	Condensing	20	Elec	117.9	34.3	2.4	42719.2	6.2	111.7	437.9	467.8	14.6	19.2	-346.9	3
40	40	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	110.4	33.6	2.2	39622.5	5.7	104.7	436.9	472.9	14.8	19.3	-339.3	3
40	40	0.8	0.3	0.1	40	80	FC	ASHP	40	NG	108.8	33.6	5.3	94759.7	23.4	85.4	436.9	521.7	16.3	24.4	-376.5	3
40	20	0.8	0.3	0.1	40	80	FC	ASHP	40	NG	109.2	34.3	5.3	95325.2	23.5	85.6	437.9	520.8	16.3	24.4	-376.3	3
40	40	0.8	0.3	0.1	40	80	FC	Condensing	40	NG	111.5	33.6	6	107734	27.3	84.1	436.9	472.9	14.8	22.9	-330.5	3
40	20	0.8	0.3	0.1	40	80	FC	Condensing	40	NG	112.2	34.3	6.1	109471.5	27.9	84.3	437.9	472.1	14.7	22.9	-330.5	3
40	40	0.8	0.3	0.1	40	80	FC	Condensing	20	NG	118.7	33.6	7.3	131797.1	34.6	84.1	436.9	468.7	14.6	24.2	-335.2	3
40	20	0.8	0.3	0.1	40	80	FC	Condensing	20	NG	119.4	34.3	7.4	133534.6	35.1	84.3	437.9	467.8	14.6	24.3	-335.2	3
40	20	0.8	0.3	0.1	40	80	FC	Condensing	40	Elec	111.1	34.3	2.3	41360	6.2	104.9	437.9	472.1	14.7	19.4	-339.3	3
40	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	94.7	21.5	1	18742.6	0	94.7	607.4	469.1	14.7	66.2	-285.2	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	93.3	21.4	1	18465.4	0	93.3	598.4	469.1	14.7	66	-282.8	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	101.5	21.5	1.1	20101.8	0	101.5	607.4	464.9	14.5	66.3	-292.8	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	100.1	21.4	1.1	19824.7	0	100.1	598.4	464.9	14.5	66.1	-290.4	4
40	40	0.8	0.4	0.1	40	80	BB	BB	40	NG	95.7	21.5	4.8	86854.1	21.7	74.1	607.4	469.1	14.7	141.9	-276.5	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	94.3	21.4	4.8	86576.9	21.7	72.7	598.4	469.1	14.7	141.2	-274	4
40	40	0.8	0.4	0.1	40	80	BB	BB	20	NG	103	21.5	6.2	110917.2	28.9	74.1	607.4	464.9	14.5	236	-281.1	4
40	40	0.8	0.3	0.1	40	80	BB	BB	20	NG	101.6	21.4	6.1	110640	28.9	72.7	598.4	464.9	14.5	234.2	-278.7	4
40	40	0.8	0.3	0.01	40	80	BB	BB	40	Elec	88.9	16.5	1	17612.3	0	88.9	531.2	470.4	14.7	65.8	-276.6	4
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	93.3	21.4	1	18465.4	0	93.3	598.4	469.1	14.7	66	-282.8	4

High-Rise MURB - Lowest Cost of GHG Abatement - CZ7a - Min 40% WWR

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	40	60	FC	Condensing	20	Elec	189	108.7	14.7	265067.1	72.7	116.4	484	26.4	0.8	4.3	-21.2	1
10	40	2	0.3	0.1	40	60	FC	Condensing	20	Elec	188.2	107.8	14.6	262705.4	72	116.2	483.1	27.3	0.9	4.4	-21	1
10	40	2	0.4	0.1	40	60	FC	Condensing	20	Elec	189.6	106.1	13.6	245594.8	66.4	123.2	500.4	27.3	0.9	3.8	-26.2	1
10	40	1.6	0.4	0.1	40	60	FC	Condensing	20	Elec	179.3	96.3	11.6	207997.1	55.1	124.3	501.7	57	1.8	6.1	-43.7	1
10	20	1.6	0.4	0.1	40	60	FC	Condensing	20	Elec	180.2	97.2	11.7	210280.6	55.7	124.4	502.6	56.1	1.8	6.1	-43.9	1
10	20	2	0.3	0.1	40	60	FC	Condensing	40	Elec	182.2	108.7	14.6	263707.9	72.7	109.5	484	30.7	1	4.9	-13.6	1
10	20	2	0.4	0.1	40	60	FC	Condensing	40	Elec	183.6	106.9	13.7	246545.1	67.1	116.5	501.3	30.7	1	4.3	-18.8	1
10	40	2	0.3	0.1	40	60	FC	Condensing	40	Elec	181.3	107.8	14.5	261346.2	72	109.4	483.1	31.6	1	5	-13.4	1
10	40	2	0.4	0.1	40	60	FC	Condensing	40	Elec	182.8	106.1	13.6	244235.6	66.4	116.4	500.4	31.6	1	4.3	-18.6	1
10	20	2	0.4	0.1	40	60	FC	Condensing	20	Elec	190.5	106.9	13.8	247904.4	67.1	123.4	501.3	26.4	0.8	3.7	-26.4	1
10	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	122.7	49.5	1.3	24287.9	0	122.7	782.9	247.2	7.7	37.7	-182	2
10	20	0.8	0.4	0.1	40	80	BB	BB	40	Elec	123.4	50.2	1.4	24425.1	0	123.4	787.9	246.4	7.7	37.6	-181.1	2
10	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	122.7	50.9	1.3	24299.4	0	122.7	778.6	246.4	7.7	37.6	-181.1	2
40	20	1.2	0.4	0.1	40	60	BB	BB	20	Elec	132.4	53.2	1.5	26220.6	0	132.4	779.7	288	9	44.7	-222.8	2
40	20	1.2	0.3	0.1	40	60	BB	BB	20	Elec	132.2	54.3	1.5	26184.3	0	132.2	770.3	288	9	44.6	-222.8	2
10	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	129.5	49.5	1.4	25647.1	0	129.5	782.9	243	7.6	37.5	-177.8	2
10	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	128.9	50.2	1.4	25517.7	0	128.9	773.6	243	7.6	37.5	-177.8	2
10	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	130.2	50.2	1.4	25784.3	0	130.2	787.9	242.1	7.6	37.4	-176.9	2
10	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	129.6	50.9	1.4	25658.7	0	129.6	778.6	242.1	7.6	37.4	-176.9	2
10	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	122	50.2	1.3	24158.5	0	122	773.6	247.2	7.7	37.7	-182	2
40	20	0.8	0.3	0.1	40	80	BB	BB	40	NG	109.3	36	5	89540.1	21.7	87.6	650.3	437.5	13.7	149.3	-399	3
40	20	0.8	0.4	0.1	40	80	BB	BB	40	Elec	109.5	35.9	1.2	21687.3	0	109.5	657.5	437.5	13.7	65.3	-372.2	3
40	20	0.8	0.3	0.1	40	80	BB	BB	40	Elec	108.2	36	1.2	21428.6	0	108.2	650.3	437.5	13.7	65.2	-372.2	3
40	40	0.8	0.4	0.1	40	80	BB	BB	20	Elec	115.7	35.3	1.3	22916	0	115.7	652.4	434.1	13.6	65.5	-368.9	3
40	40	0.8	0.3	0.1	40	80	BB	BB	20	Elec	114.4	35.4	1.3	22653.1	0	114.4	645.3	434.1	13.6	65.3	-368.9	3
40	20	0.8	0.4	0.1	40	80	BB	BB	20	Elec	116.4	35.9	1.3	23046.5	0	116.4	657.5	433.2	13.5	65.4	-368	3
40	20	0.8	0.3	0.1	40	80	BB	BB	20	Elec	115.1	36	1.3	22787.8	0	115.1	650.3	433.2	13.5	65.3	-368	3
40	40	0.8	0.3	0.1	40	80	BB	BB	40	NG	108.6	35.4	5	89405.4	21.7	86.9	645.3	438.3	13.7	149.2	-399.9	3
40	40	0.8	0.3	0.1	40	80	BB	BB	40	Elec	107.5	35.4	1.2	21293.9	0	107.5	645.3	438.3	13.7	65.2	-373.1	3
40	40	0.8	0.4	0.1	40	80	BB	BB	40	Elec	108.9	35.3	1.2	21556.8	0	108.9	652.4	438.3	13.7	65.4	-373.1	3

Low-Rise MURB - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	141.4	64	6.6	118523.5	28.9	112.5	631.8	-14	-0.4	-13.2	29.5	1
10	20	2	0.4	0.2	20	0	BB	BB	20	NG	129.4	51.5	6.5	116153.1	28.9	100.5	563.7	-14	-0.4	-11.8	50.2	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	133.5	55.7	6.5	116956.9	28.9	104.6	589.6	-14	-0.4	-12.2	43.2	1
10	20	2	0.3	0.2	20	0	BB	BB	20	NG	130.7	53.2	6.5	116403.8	28.9	101.8	552.2	-14	-0.4	-11.9	48	1
7	20	1.6	0.4	0.2	20	0	BB	BB	20	NG	132.6	54.6	6.5	116787	28.9	103.7	594.3	-14	-0.4	-12.1	44.7	1
7	20	1.6	0.3	0.2	20	0	BB	BB	20	NG	133.8	56.2	6.5	117024.8	28.9	104.9	584.9	-14	-0.4	-12.3	42.6	1
7	20	2	0.4	0.2	20	0	BB	BB	20	NG	135.9	58	6.5	117442.3	28.9	107	614.9	-14	-0.4	-12.5	39	1
7	20	2	0.3	0.2	20	0	BB	BB	20	NG	137.2	59.7	6.5	117695.9	28.9	108.3	607	-14	-0.4	-12.7	36.8	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	140	62.2	6.6	118251.4	28.9	111.1	638.2	-14	-0.4	-13	31.9	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	134.8	57.5	6.5	117229.2	28.9	105.9	578.6	-14	-0.4	-12.4	40.8	1
10	40	1.6	0.3	0.1	20	0	BB	BB	20	NG	120.5	42.7	6.4	114380.3	28.9	91.6	485.7	-11.8	-0.4	-9.2	63.5	2
10	20	2	0.4	0.1	20	0	BB	BB	20	Elec	121.6	45	1.3	24085.8	0	121.6	517.1	-12.6	-0.4	-2	48	2
10	40	1.6	0.4	0.1	20	0	BB	BB	20	NG	119.5	41.2	6.3	114189.7	28.9	90.6	491.6	-11.8	-0.4	-9.1	65.1	2
10	20	1.6	0.3	0.1	20	0	BB	BB	20	Elec	119.4	43.1	1.3	23648.9	0	119.4	489	-12.6	-0.4	-2	51.8	2
10	20	1.6	0.3	0.1	20	0	BB	BB	20	NG	120.9	43.1	6.4	114464.3	28.9	92	489	-12.6	-0.4	-9.8	63.5	2
10	20	1.6	0.4	0.1	20	0	BB	BB	20	NG	119.9	41.7	6.3	114272.7	28.9	91	494.8	-12.6	-0.4	-9.7	65.2	2
10	20	1.6	0.4	0.1	20	0	BB	BB	20	Elec	118.5	41.7	1.3	23457.4	0	118.5	494.8	-12.6	-0.4	-2	53.5	2
10	20	2	0.4	0.1	20	0	BB	BB	20	NG	123.1	45	6.4	114901.1	28.9	94.2	517.1	-12.6	-0.4	-10	59.7	2
10	40	2	0.4	0.1	20	0	BB	BB	20	NG	122.7	44.6	6.4	114817.9	28.9	93.8	513.9	-11.8	-0.4	-9.4	59.7	2
10	40	2	0.4	0.1	20	0	BB	BB	20	Elec	121.2	44.6	1.3	24002.5	0	121.2	513.9	-11.8	-0.4	-1.9	48	2
10	20	1.6	0.4	0.2	20	60	BB	BB	20	Elec	104.2	26.9	1.1	20622.4	0	104.2	430.3	12.2	0.4	1.9	53.4	3
10	20	1.6	0.3	0.2	20	60	BB	BB	20	Elec	104.6	27.9	1.2	20705	0	104.6	429.2	12.2	0.4	1.9	52.7	3
10	20	2	0.4	0.2	20	60	BB	BB	20	Elec	107	29.9	1.2	21179.9	0	107	448.6	12.2	0.4	1.9	48.6	3
10	40	2	0.4	0.2	20	60	BB	BB	20	Elec	106.6	29.5	1.2	21100.4	0	106.6	445.2	12.9	0.4	2	48.5	3
10	40	1.6	0.3	0.2	20	60	BB	BB	20	NG	105.6	27.5	6.2	111440.4	28.9	76.7	425.9	12.9	0.4	8.9	64.3	3
10	40	1.6	0.4	0.2	20	60	BB	BB	20	NG	105.2	26.5	6.2	111359	28.9	76.3	427	12.9	0.4	8.9	65	3
10	40	2	0.4	0.2	20	60	BB	BB	20	NG	108	29.5	6.2	111915.8	28.9	79.1	445.2	12.9	0.4	9.1	60.2	3
10	20	1.6	0.4	0.2	20	60	BB	BB	20	NG	105.6	26.9	6.2	111437.8	28.9	76.7	430.3	12.2	0.4	8.4	65.1	3
10	20	1.6	0.3	0.2	20	60	BB	BB	20	NG	106	27.9	6.2	111520.4	28.9	77.1	429.2	12.2	0.4	8.4	64.4	3
10	20	2	0.4	0.2	20	60	BB	BB	20	NG	108.4	29.9	6.2	111995.2	28.9	79.5	448.6	12.2	0.4	8.6	60.3	3
20	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	86.1	14.9	4.7	84943.3	21.7	64.4	329.4	45.6	1.4	15.6	61.8	4
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	86.6	14.7	4.7	85036.8	21.7	64.9	333.1	44.8	1.4	15.4	61.8	4
20	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	93.4	14.3	6.1	109026.2	28.9	64.5	329.7	41.9	1.3	26.4	56.4	4
20	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	93.3	14.9	6.1	109006.4	28.9	64.4	329.4	41.9	1.3	26.4	56.6	4
20	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	93.8	14.7	6.1	109099.9	28.9	64.9	333.1	41.1	1.3	26	56.6	4
20	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	92	14.3	1	18210.8	0	92	329.7	41.9	1.3	6.3	44.7	4
20	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	92.3	14.7	1	18284.5	0	92.3	333.1	41.1	1.3	6.2	44.9	4
20	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	91.9	14.9	1	18191	0	91.9	329.4	41.9	1.3	6.3	44.9	4
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	86.2	14.3	4.7	84963.1	21.7	64.5	329.7	45.6	1.4	15.6	61.6	4
20	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	85.5	14.7	0.9	16925.3	0	85.5	333.1	44.8	1.4	6.7	53	4

Low-Rise MURB - Lowest ICC - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.4	0.2	20	0	BB	BB	20	NG	142.2	62.8	6.6	118695	28.9	113.3	773	-12.5	-0.4	-10.4	50.3	1
10	20	1.6	0.3	0.2	20	0	BB	BB	20	NG	143.4	64.5	6.6	118929.5	28.9	114.5	769.9	-12.5	-0.4	-10.5	48.2	1
10	20	2	0.4	0.2	20	0	BB	BB	20	NG	145.9	66.4	6.6	119414.6	28.9	117	799.6	-12.5	-0.4	-10.8	44	1
10	20	2	0.3	0.2	20	0	BB	BB	20	NG	147.1	68.2	6.6	119663.3	28.9	118.2	796.6	-12.5	-0.4	-10.9	41.8	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	151.6	72.8	6.7	120544.8	28.9	122.7	828.7	-12.5	-0.4	-11.4	34.1	1
7	20	1.6	0.4	0.2	20	0	BB	BB	20	NG	149.8	70.2	6.7	120188.2	28.9	120.9	830.4	-12.5	-0.4	-11.2	37.2	1
7	20	1.6	0.3	0.2	20	0	BB	BB	20	NG	151	71.9	6.7	120426.2	28.9	122.1	827.4	-12.5	-0.4	-11.3	35.2	1
7	20	2	0.4	0.2	20	0	BB	BB	20	NG	153.4	73.8	6.7	120908.8	28.9	124.5	856.7	-12.5	-0.4	-11.6	31	1
7	20	2	0.3	0.2	20	0	BB	BB	20	NG	154.7	75.6	6.7	121159.1	28.9	125.8	853.8	-12.5	-0.4	-11.7	28.8	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	150.2	70.9	6.7	120279.7	28.9	121.3	831.7	-12.5	-0.4	-11.2	36.4	1
10	20	1.6	0.4	0.2	20	60	BB	BB	20	Elec	117.4	38.8	1.3	23246.7	0	117.4	649	12.4	0.4	1.9	54.1	2
10	20	1.6	0.3	0.2	20	60	BB	BB	20	Elec	117.9	40	1.3	23347.2	0	117.9	645.8	12.4	0.4	1.9	53.2	2
10	20	2	0.4	0.2	20	60	BB	BB	20	Elec	120.6	42.2	1.3	23884.7	0	120.6	676.2	12.4	0.4	1.9	48.5	2
10	20	2	0.3	0.2	20	60	BB	BB	20	Elec	121.2	43.4	1.3	24006.6	0	121.2	673.1	12.4	0.4	1.9	47.5	2
10	40	2	0.4	0.2	20	60	BB	BB	20	NG	121.5	41.7	6.4	114596.3	28.9	92.6	671.8	13.1	0.4	9.2	60.4	2
10	40	2	0.3	0.2	20	60	BB	BB	20	NG	122.2	42.9	6.4	114716.8	28.9	93.3	668.7	13.1	0.4	9.2	59.3	2
10	20	2	0.3	0.2	20	60	BB	BB	20	NG	122.7	43.4	6.4	114821.9	28.9	93.8	673.1	12.4	0.4	8.7	59.1	2
10	20	2	0.4	0.2	20	60	BB	BB	20	NG	122.1	42.2	6.4	114700.1	28.9	93.2	676.2	12.4	0.4	8.7	60.2	2
10	20	1.6	0.3	0.2	20	60	BB	BB	20	NG	119.4	40	6.3	114162.5	28.9	90.5	645.8	12.4	0.4	8.5	64.9	2
10	20	1.6	0.4	0.2	20	60	BB	BB	20	NG	118.8	38.8	6.3	114062	28.9	89.9	649	12.4	0.4	8.5	65.8	2
10	40	2	0.4	0.1	20	60	BB	BB	20	NG	114.9	34.9	6.3	113289.3	28.9	86	615.8	14.4	0.5	9.6	70.4	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	110.5	31.7	1.2	21871.7	0	110.5	588.6	14.4	0.5	2.2	64	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	110.7	32.6	1.2	21926.3	0	110.7	585.5	14.4	0.5	2.2	63.5	3
10	40	2	0.4	0.1	20	60	BB	BB	20	Elec	113.5	34.9	1.2	22474	0	113.5	615.8	14.4	0.5	2.2	58.8	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	111	32.2	1.2	21972.8	0	111	593	13.7	0.4	2.1	63.9	3
10	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	111.3	33.1	1.2	22029	0	111.3	589.9	13.7	0.4	2.1	63.4	3
10	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.7	33.1	6.3	112844.4	28.9	83.8	589.9	13.7	0.4	9	75.1	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	111.9	31.7	6.3	112687.1	28.9	83	588.6	14.4	0.5	9.4	75.7	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.2	32.6	6.3	112741.6	28.9	83.3	585.5	14.4	0.5	9.4	75.2	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	112.4	32.2	6.3	112788.2	28.9	83.5	593	13.7	0.4	9	75.6	3
20	40	1.2	0.3	0.1	20	60	BB	BB	20	Elec	99.2	21	1.1	19650.7	0	99.2	478	73.3	2.3	10.9	24.5	4
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	94	20.9	4.8	86519.3	21.7	72.4	486.1	76.1	2.4	25.5	41.3	4
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	94	21.5	4.8	86501.8	21.7	72.3	482.4	76.1	2.4	25.5	41.5	4
20	40	1.2	0.4	0.1	20	60	BB	BB	20	NG	100.8	20.4	6.1	110485.8	28.9	71.9	481.6	73.3	2.3	44.2	36	4
20	40	1.2	0.3	0.1	20	60	BB	BB	20	NG	100.7	21	6.1	110466.1	28.9	71.8	478	73.3	2.3	44.2	36.2	4
20	20	1.2	0.4	0.1	20	60	BB	BB	20	NG	101.3	20.9	6.1	110582.4	28.9	72.4	486.1	72.6	2.3	43.9	35.9	4
20	20	1.2	0.3	0.1	20	60	BB	BB	20	NG	101.2	21.5	6.1	110564.8	28.9	72.3	482.4	72.6	2.3	43.9	36.1	4
20	20	1.2	0.3	0.1	20	60	BB	BB	20	Elec	99.7	21.5	1.1	19749.5	0	99.7	482.4	72.6	2.3	10.8	24.4	4
20	20	1.2	0.4	0.1	20	60	BB	BB	20	Elec	99.8	20.9	1.1	19767.1	0	99.8	486.1	72.6	2.3	10.8	24.2	4
20	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	99.3	20.4	1.1	19670.5	0	99.3	481.6	73.3	2.3	10.9	24.3	4

Low-Rise MURB - Lowest ICC - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	1.6	0.3	0.2	20	0	FC	Condensing	20	NG	196.8	109.9	23.6	425107.4	123.3	73.5	423.5	-38.8	-1.2	-22.2	71.4	1
7	20	2	0.4	0.2	20	0	FC	Condensing	20	Elec	199.8	112.7	18.9	340248.6	96	103.8	431.7	-38.8	-1.2	-6	52.7	1
7	20	2	0.4	0.2	20	0	FC	Condensing	20	NG	201.3	112.7	23.9	431064	124.9	76.4	431.7	-38.8	-1.2	-27.3	64.4	1
7	20	1.6	0.4	0.2	20	0	FC	Condensing	20	NG	195.7	107.7	22.9	411764.3	119.1	76.6	432.2	-38.8	-1.2	-15.6	71.1	1
10	20	2.5	0.3	0.2	20	0	FC	Condensing	20	NG	197.3	111.1	24	431394.8	125.3	72	419.8	-38.8	-1.2	-27.7	71.5	1
10	20	2	0.4	0.2	20	0	FC	Condensing	20	NG	189.4	102.7	21.9	394172.3	113.9	75.5	429.2	-38.8	-1.2	-11.2	79.6	1
10	20	2	0.3	0.2	20	0	FC	Condensing	20	NG	190.5	105	22.6	407681.1	118.1	72.3	420.5	-38.8	-1.2	-14.3	79.8	1
10	20	1.6	0.3	0.2	20	0	FC	Condensing	20	NG	184.8	99.8	21.6	388096.2	112.2	72.6	420.9	-38.8	-1.2	-10.2	86.6	1
10	20	1.6	0.4	0.2	20	0	FC	Condensing	20	NG	183.8	97.7	20.8	374898.7	108.1	75.8	429.6	-38.8	-1.2	-8.6	86.3	1
10	20	2.5	0.4	0.2	20	0	FC	Condensing	20	NG	196	108.7	23.2	417503.9	120.9	75.1	428.5	-38.8	-1.2	-17.9	71.5	1
20	40	1.6	0.4	0.1	20	60	FC	Condensing	20	NG	128.1	46.6	10.4	186717.3	51.5	76.5	425	15.1	0.5	1	100.8	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	126.9	47.2	10.8	194257.3	54	72.9	416.2	15.1	0.5	1	103.9	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	120.5	48	9.6	172256.6	47.4	73.1	417.2	18.5	0.6	1.2	108.4	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	121.6	47.4	9.1	164672	44.9	76.7	426	18.5	0.6	1.1	105.3	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	127.7	48	10.9	196319.7	54.6	73.1	417.2	14.3	0.4	1	103.8	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	126.3	48	5.9	105504.4	25.7	100.5	417.2	14.3	0.4	0.7	92.1	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	127.4	47.4	5.4	97919.7	23.2	104.2	426	14.3	0.4	0.7	88.9	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	NG	128.8	47.4	10.5	188735.1	52.1	76.7	426	14.3	0.4	1	100.6	2
20	40	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	126.6	46.6	5.3	95901.9	22.6	104	425	15.1	0.5	0.8	89.1	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	125.5	47.2	5.7	103441.9	25.1	100.4	416.2	15.1	0.5	0.8	92.3	2
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	104.4	33	4.9	88562	21.7	82.7	665.6	91.3	2.9	29	70.5	3
20	20	1.2	0.4	0.1	20	60	BB	BB	20	NG	111.6	33	6.3	112625.1	28.9	82.7	665.6	87	2.7	48.2	65.8	3
20	40	1.2	0.3	0.1	20	60	BB	BB	20	NG	111.2	33.2	6.3	112538.3	28.9	82.2	654.3	87.9	2.7	48.5	65.7	3
20	40	1.2	0.4	0.1	20	60	BB	BB	20	NG	110.9	32.4	6.2	112492.9	28.9	82	659.9	87.9	2.7	48.5	66.1	3
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	104.6	33.9	4.9	88610	21.7	82.9	660	91.3	2.9	29.1	70	3
20	20	1.2	0.3	0.1	20	60	BB	BB	20	Elec	110.4	33.9	1.2	21857.7	0	110.4	660	87	2.7	12.7	53.7	3
20	20	1.2	0.3	0.1	20	60	BB	BB	20	NG	111.8	33.9	6.3	112673	28.9	82.9	660	87	2.7	48.2	65.4	3
20	40	1.2	0.3	0.1	20	60	BB	BB	20	Elec	109.7	33.2	1.2	21723	0	109.7	654.3	87.9	2.7	12.8	54	3
20	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	109.5	32.4	1.2	21677.5	0	109.5	659.9	87.9	2.7	12.8	54.4	3
20	20	1.2	0.4	0.1	20	60	BB	BB	20	Elec	110.1	33	1.2	21809.8	0	110.1	665.6	87	2.7	12.7	54.1	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	93.6	21.4	4.8	86423.4	21.7	71.9	592.4	151.8	4.7	46.5	28.7	4
20	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	93.1	21.6	4.8	86333	21.7	71.4	586.8	151.8	4.7	46.4	29.5	4
20	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	98.9	21.6	1.1	19580.8	0	98.9	586.8	147.5	4.6	21.1	13.1	4
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	99.3	21.4	1.1	19671.1	0	99.3	592.4	147.5	4.6	21.2	12.3	4
20	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	100.2	20.8	6.1	110364	28.9	71.3	586.7	148.4	4.6	76.8	24.2	4
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	99.7	21	6.1	110270.6	28.9	70.8	581.1	148.4	4.6	76.6	25	4
20	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	100.8	21.4	6.1	110486.5	28.9	71.9	592.4	147.5	4.6	76.6	24	4
20	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	100.3	21.6	6.1	110396.1	28.9	71.4	586.8	147.5	4.6	76.4	24.8	4
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	98.3	21	1.1	19455.3	0	98.3	581.1	148.4	4.6	21.2	13.3	4
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	98.7	20.8	1.1	19548.6	0	98.7	586.7	148.4	4.6	21.3	12.5	4

Low-Rise MURB - Lowest ICC - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.4	0.2	20	60	BB	BB	20	Elec	156.3	79.3	1.7	30945.6	0	156.3	941.2	-5.3	-0.2	-0.9	-8	1
10	20	1.6	0.3	0.2	20	60	BB	BB	20	Elec	157.2	80.8	1.7	31126.8	0	157.2	935.3	-5.3	-0.2	-0.9	-10.4	1
10	40	1.6	0.3	0.2	20	60	BB	BB	20	Elec	156.4	80	1.7	30974.3	0	156.4	930.4	-4.4	-0.1	-0.7	-9.3	1
10	40	1.6	0.3	0.2	20	60	BB	BB	20	NG	157.9	80	6.8	121789.6	28.9	129	930.4	-4.4	-0.1	-4.2	22.9	1
10	40	1.6	0.4	0.2	20	60	BB	BB	20	NG	157	78.6	6.8	121609.6	28.9	128.1	936.3	-4.4	-0.1	-4.1	24.5	1
10	20	1.6	0.3	0.2	20	60	BB	BB	20	NG	158.6	80.8	6.8	121942.1	28.9	129.7	935.3	-5.3	-0.2	-5.1	22.5	1
7	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	159.2	81.1	6.8	122053.1	28.9	130.3	938.1	-3.7	-0.1	-3.6	19.9	1
7	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	158.4	79.8	6.8	121889.9	28.9	129.5	944	-3.7	-0.1	-3.5	21.3	1
10	20	1.6	0.4	0.2	20	60	BB	BB	20	NG	157.7	79.3	6.8	121760.9	28.9	128.8	941.2	-5.3	-0.2	-5	24.1	1
10	40	1.6	0.4	0.2	20	60	BB	BB	20	Elec	155.5	78.6	1.7	30794.3	0	155.5	936.3	-4.4	-0.1	-0.7	-7	1
20	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	132.3	54.2	6.5	116733.5	28.9	103.4	742.4	10.2	0.3	7.6	52.4	2
20	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	131.9	53.2	6.5	116653.6	28.9	103	748.3	10.2	0.3	7.5	53.1	2
20	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	130.5	53.2	1.4	25838.3	0	130.5	748.3	10.2	0.3	1.6	41.4	2
20	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	125.9	55	5.2	92819.6	21.7	104.2	747.3	13.6	0.4	5.1	56.6	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	125.5	54	5.2	92737.9	21.7	103.8	753.2	13.6	0.4	5.1	57.3	2
20	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	131.2	54	1.4	25985.6	0	131.2	753.2	9.3	0.3	1.5	41	2
20	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	131.6	55	1.4	26067.3	0	131.6	747.3	9.3	0.3	1.5	40.3	2
20	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	132.7	54	6.5	116801	28.9	103.8	753.2	9.3	0.3	6.9	52.7	2
20	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	133.1	55	6.5	116882.7	28.9	104.2	747.3	9.3	0.3	6.9	52	2
20	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	130.9	54.2	1.4	25918.1	0	130.9	742.4	10.2	0.3	1.6	40.7	2
20	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	117.3	39.4	1.3	23227.5	0	117.3	669.8	105.5	3.3	16.1	-31.2	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	117.1	39.9	1.3	23190.4	0	117.1	663.9	105.5	3.3	16.1	-30.9	3
20	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	114.9	35.2	6.3	113277.8	28.9	86	633.5	114.3	3.6	74.3	-21.6	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	111.3	39.9	5	89942.7	21.7	89.7	663.9	109.8	3.4	38.7	-14.5	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	118.8	39.4	6.3	114042.8	28.9	89.8	669.8	105.5	3.3	70.5	-19.5	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	118.6	39.9	6.3	114005.8	28.9	89.7	663.9	105.5	3.3	70.4	-19.2	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	110.3	39.9	1.2	21831.2	0	110.3	663.9	109.8	3.4	16.6	-23.3	3
20	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	114.5	35.5	6.3	113201.1	28.9	85.6	627.8	114.3	3.6	74.1	-20.9	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	111.5	39.4	5	89979.8	21.7	89.8	669.8	109.8	3.4	38.8	-14.9	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	110.4	39.4	1.2	21868.2	0	110.4	669.8	109.8	3.4	16.6	-23.6	3
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	171.6	5.4	101.9	-56	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	171.6	5.4	25.5	-67.7	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	175.9	5.5	58.2	-51.4	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	175.9	5.5	25.8	-60.1	4

Low-Rise MURB - Lowest ICC - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	0.8	0.4	0.2	60	60	FC	Condensing	20	Elec	202.2	121.2	11.8	212041.8	54.9	147.3	598.2	-604.4	-18.9	-66.5	576.9	1
7	20	0.8	0.4	0.1	60	60	FC	Condensing	20	NG	199	116.4	15.7	282645.4	77.7	121.3	601.1	-603.5	-18.9	-116.8	605.4	1
10	20	0.8	0.3	0.2	60	60	FC	Condensing	20	NG	199.3	122.2	17.9	322435.2	90.3	109	573.9	-605.6	-18.9	-204.7	613.1	1
10	20	0.8	0.4	0.2	60	60	FC	Condensing	20	NG	204.6	122.2	17	305456.5	84.6	120	599.4	-605.6	-18.9	-155.2	601.2	1
10	40	0.8	0.3	0.2	60	60	FC	Condensing	20	NG	198.3	121.1	17.8	319774.2	89.6	108.8	572.7	-604.4	-18.9	-194.6	613.3	1
10	40	0.8	0.4	0.2	60	60	FC	Condensing	20	NG	203.6	121.2	16.8	302857.2	83.8	119.8	598.2	-604.4	-18.9	-149.4	601.3	1
10	20	0.8	0.3	0.2	60	60	FC	Condensing	20	Elec	197.9	122.2	12.9	231619.9	61.4	136.4	573.9	-605.6	-18.9	-75.7	598	1
10	20	0.8	0.4	0.2	60	60	FC	Condensing	20	Elec	203.2	122.2	11.9	214641.1	55.7	147.5	599.4	-605.6	-18.9	-67.7	576.6	1
7	20	0.8	0.3	0.1	60	60	FC	Condensing	20	NG	193.3	116	16.6	298253.2	83	110.3	575.6	-603.5	-18.9	-140.3	617.9	1
10	40	0.8	0.3	0.2	60	60	FC	Condensing	20	Elec	196.9	121.1	12.7	228958.9	60.7	136.2	572.7	-604.4	-18.9	-74.1	598.4	1
20	20	0.8	0.3	0.1	20	60	BB	BB	20	NG	138.6	60	6.6	117971	28.9	109.7	813.7	87.6	2.7	61.4	-0.9	2
20	40	0.8	0.4	0.1	20	60	BB	BB	20	Elec	136.3	58.4	1.5	26984.4	0	136.3	813.6	88.8	2.8	13.7	-15.5	2
20	20	0.8	0.4	0.1	20	60	BB	BB	20	NG	138.6	59.3	6.6	117976.4	28.9	109.7	820.7	87.6	2.7	61.4	-0.9	2
20	40	0.8	0.3	0.1	20	60	BB	BB	20	NG	137.7	59.1	6.5	117792	28.9	108.8	806.6	88.8	2.8	61.8	-0.5	2
20	40	0.8	0.4	0.1	20	60	BB	BB	20	NG	137.7	58.4	6.5	117799.7	28.9	108.8	813.6	88.8	2.8	61.8	-0.6	2
20	20	0.8	0.3	0.1	20	60	BB	BB	40	NG	131.4	60	5.2	93907.9	21.7	109.7	813.7	93.2	2.9	33.7	2.5	2
20	20	0.8	0.4	0.1	20	60	BB	BB	40	NG	131.4	59.3	5.2	93913.3	21.7	109.7	820.7	93.2	2.9	33.7	2.4	2
20	20	0.8	0.4	0.1	20	60	BB	BB	20	Elec	137.2	59.3	1.5	27161.1	0	137.2	820.7	87.6	2.7	13.5	-16.6	2
20	40	0.8	0.3	0.1	20	60	BB	BB	20	Elec	136.2	59.1	1.5	26976.7	0	136.2	806.6	88.8	2.8	13.7	-15.4	2
20	20	0.8	0.3	0.1	20	60	BB	BB	20	Elec	137.1	60	1.5	27155.6	0	137.1	813.7	87.6	2.7	13.5	-16.6	2
20	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	121.7	49	5.1	91986.3	21.7	100	772	160.7	5	56	-48.3	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	121.2	49.3	5.1	91897.1	21.7	99.5	765.2	160.7	5	55.9	-47.5	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	122.5	49.9	5.1	92158.3	21.7	100.9	779.1	159.5	5	55.8	-48.6	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	127.4	49	1.4	25234	0	127.4	772	155.1	4.8	23.6	-63.3	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	128.9	49	6.4	116049.4	28.9	100	772	155.1	4.8	101.2	-51.6	3
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	128.3	49.9	1.4	25406.1	0	128.3	779.1	154	4.8	23.4	-63.6	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	128.4	49.3	6.4	115960.2	28.9	99.5	765.2	155.1	4.8	100.8	-50.9	3
20	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	129.8	49.9	6.5	116221.4	28.9	100.9	779.1	154	4.8	101	-52	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	127	49.3	1.4	25144.9	0	127	765.2	155.1	4.8	23.6	-62.5	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	Elec	121.4	49.9	1.3	24046.8	0	121.4	779.1	159.5	5	24	-57.4	3
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	105	32.4	4.9	88689.3	21.7	83.3	595.5	234.5	7.3	76.8	-93.3	4
40	40	0.8	0.4	0.01	20	80	BB	BB	40	NG	106.3	32.8	4.9	88937.6	21.7	84.6	599.4	234.5	7.3	77.1	-95.5	4
40	40	0.8	0.4	0.01	20	80	BB	BB	40	Elec	105.2	32.8	1.2	20826.1	0	105.2	599.4	234.5	7.3	34.4	-104.2	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	103.9	32.4	1.1	20577.8	0	103.9	595.5	234.5	7.3	34.3	-102.1	4
40	20	0.8	0.4	0.01	20	80	BB	BB	40	Elec	106	33.6	1.2	20987.4	0	106	606.6	233.3	7.3	34.2	-104.5	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	Elec	104.8	33.3	1.2	20742.7	0	104.8	602.6	233.3	7.3	34.2	-102.4	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	NG	105.8	33.3	4.9	88854.2	21.7	84.2	602.6	233.3	7.3	76.6	-93.6	4
40	20	0.8	0.4	0.01	20	80	BB	BB	40	NG	107.1	33.6	4.9	89099	21.7	85.4	606.6	233.3	7.3	77	-95.7	4

Low-Rise MURB - Lowest ICC - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	171.3	94.7	1.9	33921.7	0	171.3	953.2	7.2	0.2	1.1	15.3	1
20	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	170.9	93.6	1.9	33844.8	0	170.9	960.7	7.2	0.2	1.1	16	1
20	40	2	0.4	0.1	20	60	BB	BB	20	NG	178.4	99.8	7	125852.3	28.9	149.5	992.5	8.3	0.3	7.5	16.1	1
20	20	2	0.4	0.1	20	60	BB	BB	20	Elec	177.9	100.8	2	35227.7	0	177.9	998.8	7.2	0.2	1.2	3.9	1
20	40	2	0.3	0.1	20	60	BB	BB	20	NG	178.9	101	7	125961.6	28.9	150	985.1	8.3	0.3	7.5	15.1	1
20	20	2	0.3	0.1	20	60	BB	BB	20	Elec	178.5	102	2	35338.7	0	178.5	991.4	7.2	0.2	1.2	2.9	1
20	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	172.4	93.6	6.9	124660.1	28.9	143.5	960.7	7.2	0.2	6.1	27.6	1
20	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	172.8	94.7	6.9	124737	28.9	143.9	953.2	7.2	0.2	6.1	27	1
20	20	2	0.3	0.1	20	60	BB	BB	20	NG	179.9	102	7	126154.1	28.9	151	991.4	7.2	0.2	6.5	14.6	1
20	20	2	0.4	0.1	20	60	BB	BB	20	NG	179.4	100.8	7	126043.1	28.9	150.5	998.8	7.2	0.2	6.5	15.6	1
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	158	86.3	5.5	99175.6	21.7	136.3	920	70.9	2.2	27.3	-14.8	2
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	158.1	87.1	5.5	99210.5	21.7	136.5	912.3	70.9	2.2	27.3	-15.1	2
20	20	1.2	0.3	0.1	20	60	BB	BB	20	Elec	163.9	87.1	1.8	32458.2	0	163.9	912.3	65.3	2	10.4	-30.1	2
20	20	1.2	0.4	0.1	20	60	BB	BB	20	Elec	163.7	86.3	1.8	32423.4	0	163.7	920	65.3	2	10.4	-29.8	2
20	20	1.2	0.4	0.1	20	60	BB	BB	20	NG	165.2	86.3	6.8	123238.7	28.9	136.3	920	65.3	2	51.8	-18.2	2
20	20	1.2	0.3	0.1	20	60	BB	BB	20	NG	165.4	87.1	6.8	123273.6	28.9	136.5	912.3	65.3	2	51.9	-18.5	2
20	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	162.8	85.3	1.8	32233.5	0	162.8	913.7	66.5	2.1	10.5	-29.3	2
20	40	1.2	0.4	0.1	20	60	BB	BB	20	NG	164.2	85.3	6.8	123048.8	28.9	135.3	913.7	66.5	2.1	52.3	-17.7	2
20	40	1.2	0.3	0.1	20	60	BB	BB	20	NG	164.4	86.2	6.8	123081.7	28.9	135.5	906	66.5	2.1	52.4	-18	2
20	40	1.2	0.3	0.1	20	60	BB	BB	20	Elec	163	86.2	1.8	32266.3	0	163	906	66.5	2.1	10.5	-29.6	2
20	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	152	74.2	1.7	30097.9	0	152	872.5	132.8	4.1	20.6	-77.1	3
40	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	152	74.5	1.7	30088.6	0	152	839.4	138.6	4.3	21.5	-82.8	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	151.7	74.6	1.7	30043.7	0	151.7	864.8	132.8	4.1	20.6	-76.6	3
40	40	1.2	0.4	0.1	20	60	BB	BB	20	NG	153.4	74.5	6.7	120903.9	28.9	124.5	839.4	138.6	4.3	99.7	-71.1	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	146.2	74.2	5.4	96850.2	21.7	124.5	872.5	138.4	4.3	50.8	-62	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	145.9	74.6	5.4	96795.9	21.7	124.3	864.8	138.4	4.3	50.7	-61.6	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	144.9	74.6	1.6	28684.4	0	144.9	864.8	138.4	4.3	21.2	-70.3	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	153.4	74.2	6.7	120913.3	28.9	124.5	872.5	132.8	4.1	95.6	-65.4	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	153.2	74.6	6.7	120859	28.9	124.3	864.8	132.8	4.1	95.4	-64.9	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	145.1	74.2	1.6	28738.7	0	145.1	872.5	138.4	4.3	21.3	-70.8	3
40	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	129.7	58	5.2	93573.5	21.7	108	753	221.9	6.9	76.3	-117	4
40	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	136.8	57.1	6.5	117614.5	28.9	107.9	754.2	217.5	6.8	138.3	-121.3	4
40	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	136	57	6.5	117451.2	28.9	107.1	746.6	217.5	6.8	137.5	-119.9	4
40	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	137.7	58	6.5	117796.6	28.9	108.8	760.6	216.4	6.8	138.4	-121.8	4
40	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	136.9	58	6.5	117636.6	28.9	108	753	216.4	6.8	137.6	-120.4	4
40	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	135.5	58	1.5	26821.3	0	135.5	753	216.4	6.8	32.7	-132	4
40	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	136.3	58	1.5	26981.2	0	136.3	760.6	216.4	6.8	32.7	-133.4	4
40	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	134.5	57	1.5	26635.9	0	134.5	746.6	217.5	6.8	32.8	-131.6	4
40	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	135.3	57.1	1.5	26799.1	0	135.3	754.2	217.5	6.8	32.9	-133	4
40	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	130.5	58	5.2	93733.5	21.7	108.8	760.6	221.9	6.9	76.5	-118.4	4

Low-Rise MURB - Highest NPV - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.4	0.1	20	0	FC	Condensing	40	NG	128.1	46	11.9	214988	60.5	67.6	322	-5.6	-0.2	-0.8	69.1	1
10	20	2	0.3	0.1	20	0	FC	Condensing	40	NG	128	47.7	12.4	223585.6	63.3	64.7	308.2	-5.6	-0.2	-0.9	70.7	1
10	20	1.6	0.3	0.1	20	0	FC	Condensing	20	NG	131.8	44.5	13.1	235368.2	66.8	65	309	-9.3	-0.3	-1.7	69.5	1
10	40	2	0.3	0.1	20	0	FC	Condensing	40	NG	127.5	47.3	12.3	222262.7	62.9	64.6	307.5	-4.8	-0.1	-0.8	70.5	1
10	40	2	0.4	0.1	20	0	FC	Condensing	40	NG	127.6	45.6	11.9	213685.4	60.2	67.5	329.1	-4.8	-0.1	-0.7	69	1
10	40	1.6	0.3	0.2	20	0	FC	Condensing	40	NG	130.9	50.4	13	233916.7	66.4	64.5	308.3	-6.2	-0.2	-1.1	67.8	1
10	40	1.6	0.4	0.1	20	0	FC	Condensing	20	NG	131.6	42.4	12.5	225813.5	63.8	67.8	331	-8.5	-0.3	-1.4	67.6	1
10	40	1.6	0.3	0.1	20	0	FC	Condensing	20	NG	131.3	44	13	234049.9	66.4	64.9	312	-8.5	-0.3	-1.5	69.4	1
10	20	1.6	0.4	0.1	20	0	FC	Condensing	20	NG	132.1	42.9	12.6	227111.3	64.2	67.9	322.7	-9.3	-0.3	-1.5	67.8	1
10	20	1.6	0.3	0.2	20	0	FC	Condensing	40	NG	131.4	50.9	13.1	235257.8	66.8	64.5	309	-7	-0.2	-1.2	68	1
10	20	1.6	0.3	0.1	20	0	FC	Condensing	40	NG	124.6	44.5	11.7	211305.2	59.6	65	309	-5.6	-0.2	-0.8	74.8	2
10	20	1.6	0.4	0.1	20	0	FC	Condensing	40	NG	124.8	42.9	11.3	203048.2	56.9	67.9	322.7	-5.6	-0.2	-0.8	73	2
10	40	1.6	0.3	0.1	20	0	FC	Condensing	40	NG	124.1	44	11.7	209986.8	59.2	64.9	312	-4.8	-0.1	-0.7	74.6	2
10	40	1.6	0.4	0.1	20	0	FC	Condensing	40	NG	124.4	42.4	11.2	201750.4	56.6	67.8	331	-4.8	-0.1	-0.6	72.8	2
10	40	1.6	0.3	0.1	20	0	FC	Condensing	40	Elec	123	44	7.9	141875.3	37.5	85.5	312	-4.8	-0.1	-0.4	65.9	2
10	20	1.6	0.3	0.1	20	0	BB	BB	40	NG	113.7	43.1	5	90401.2	21.7	92	489	-8.9	-0.3	-3.4	68.7	2
10	20	1.6	0.4	0.1	20	0	BB	BB	40	NG	112.7	41.7	5	90209.7	21.7	91	494.8	-8.9	-0.3	-3.4	70.4	2
10	40	1.6	0.4	0.1	20	0	BB	BB	40	NG	112.3	41.2	5	90126.7	21.7	90.6	491.6	-8.1	-0.3	-3.1	70.4	2
10	20	1.6	0.3	0.1	20	0	FC	Condensing	40	Elec	123.5	44.5	8	143193.6	37.9	85.6	309	-5.6	-0.2	-0.5	66	2
10	40	1.6	0.3	0.1	20	0	BB	BB	40	NG	113.2	42.7	5	90317.2	21.7	91.6	485.7	-8.1	-0.3	-3.1	68.7	2
10	40	2	0.3	0.1	20	60	BB	BB	40	NG	95.7	24.7	4.8	86845.7	21.7	74	404.5	18.1	0.6	6.4	72.8	3
10	20	2	0.3	0.1	20	60	BB	BB	40	NG	96.1	25.1	4.8	86924.5	21.7	74.4	407.8	17.3	0.5	6.1	72.9	3
10	20	2	0.4	0.1	20	60	BB	BB	40	NG	95.8	24.2	4.8	86866.1	21.7	74.1	408.9	17.3	0.5	6.1	73.4	3
10	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	104.3	24.6	7.7	138068.9	37.5	66.8	308.9	20.6	0.6	1.9	72.8	3
10	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	93.4	22.2	4.8	86382.3	21.7	71.7	389.5	17.3	0.5	6.1	77.6	3
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	93.2	21.4	4.8	86349.1	21.7	71.5	390.5	17.3	0.5	6.1	77.9	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	100.4	21.4	6.1	110412.2	28.9	71.5	390.5	13.6	0.4	9	72.7	3
10	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	93	21.8	4.8	86304.3	21.7	71.3	386.1	18.1	0.6	6.3	77.5	3
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	92.8	21.1	4.8	86272.4	21.7	71.1	387.2	18.1	0.6	6.3	77.8	3
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	95.4	23.8	4.8	86788.5	21.7	73.7	405.6	18.1	0.6	6.4	73.3	3
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	86.6	14.7	4.7	85036.8	21.7	64.9	333.1	44.8	1.4	15.4	61.8	4
20	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	86.1	14.9	4.7	84943.3	21.7	64.4	329.4	45.6	1.4	15.6	61.8	4
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	86.2	14.3	4.7	84963.1	21.7	64.5	329.7	45.6	1.4	15.6	61.6	4
20	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	91.9	14.9	1	18191	0	91.9	329.4	41.9	1.3	6.3	44.9	4
20	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	85.5	14.7	0.9	16925.3	0	85.5	333.1	44.8	1.4	6.7	53	4
20	40	1.6	0.3	0.1	20	60	BB	BB	40	Elec	85	14.9	0.9	16831.8	0	85	329.4	45.6	1.4	6.8	53	4
20	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	93.4	14.3	6.1	109026.2	28.9	64.5	329.7	41.9	1.3	26.4	56.4	4
20	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	93.3	14.9	6.1	109006.4	28.9	64.4	329.4	41.9	1.3	26.4	56.6	4
20	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	93.8	14.7	6.1	109099.9	28.9	64.9	333.1	41.1	1.3	26	56.6	4
20	40	1.6	0.4	0.1	20	60	BB	BB	40	Elec	85.1	14.3	0.9	16851.6	0	85.1	329.7	45.6	1.4	6.8	52.9	4

Low-Rise MURB - Highest NPV - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.4	0.1	20	0	FC	Condensing	40	NG	146.4	62.1	14.1	254149.7	71.9	74.5	358.1	-3.7	-0.1	-0.6	72.2	1
10	20	1.6	0.3	0.1	20	0	FC	Condensing	20	NG	150.1	60.8	15.3	275591.3	78.5	71.6	352	-8	-0.3	-1.5	73.3	1
10	40	1.6	0.4	0.1	20	0	FC	Condensing	40	NG	142.6	58.6	13.4	241109.5	68	74.7	358.1	-3.7	-0.1	-0.5	76.8	1
10	40	1.6	0.3	0.1	20	0	FC	Condensing	40	NG	142.3	60.1	13.9	249929.6	70.8	71.5	351	-3.7	-0.1	-0.6	78.8	1
10	20	2	0.3	0.1	20	0	FC	Condensing	40	NG	146.8	64.3	14.7	264893.3	75.3	71.5	352.1	-4.5	-0.1	-0.8	73.9	1
10	20	2.5	0.3	0.1	20	60	FC	Condensing	40	NG	126.6	45	10.8	194374.5	54.1	72.5	352	20.4	0.6	2.1	73.5	1
10	20	1.6	0.3	0.1	20	0	FC	Condensing	40	NG	142.9	60.8	14	251528.2	71.3	71.6	352	-4.5	-0.1	-0.7	78.7	1
10	40	1.6	0.3	0.1	20	0	FC	Condensing	20	NG	149.5	60.1	15.2	273992.6	78	71.5	351	-7.3	-0.2	-1.3	73.4	1
10	20	1.6	0.4	0.1	20	0	FC	Condensing	40	NG	143.2	59.2	13.5	242684.2	68.4	74.8	359	-4.5	-0.1	-0.6	76.7	1
10	40	2	0.3	0.1	20	0	FC	Condensing	40	NG	146.2	63.7	14.6	263289.7	74.8	71.3	351.2	-3.7	-0.1	-0.6	74	1
10	40	1.6	0.3	0.2	20	60	FC	Condensing	40	NG	125.6	44	10.6	191389	53.2	72.5	351.1	19.8	0.6	2	75.3	2
10	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	118.7	37.6	9.3	167050.8	45.8	72.9	351	21.1	0.7	1.9	82.3	2
10	40	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	120.2	36.9	9	161186.7	43.9	76.4	358.1	21.1	0.7	1.8	78.7	2
10	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	120.8	37.4	9	162649.7	44.3	76.5	359	20.4	0.6	1.8	78.7	2
10	40	2	0.3	0.1	20	60	FC	Condensing	40	NG	122	40.7	9.9	178587.7	49.3	72.7	351.1	21.1	0.7	2	78.4	2
10	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	122.6	41.3	10	180099.6	49.8	72.8	352.1	20.4	0.6	1.9	78.3	2
10	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	119.3	38.2	9.4	168549.6	46.3	73.1	352	20.4	0.6	1.8	82.2	2
10	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	126.6	38.2	10.7	192612.7	53.5	73.1	352	16.8	0.5	1.7	76.8	2
10	20	2	0.4	0.1	20	60	BB	BB	40	NG	108.2	35.4	5	89328.2	21.7	86.6	620.2	17.2	0.5	6.1	75.7	2
10	40	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	126	37.6	10.6	191113.9	53.1	72.9	351	17.6	0.5	1.8	76.9	2
10	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.7	33.1	6.3	112844.4	28.9	83.8	589.9	13.7	0.4	9	75.1	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	112.4	32.2	6.3	112788.2	28.9	83.5	593	13.7	0.4	9	75.6	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	112.2	32.6	6.3	112741.6	28.9	83.3	585.5	14.4	0.5	9.4	75.2	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	111.9	31.7	6.3	112687.1	28.9	83	588.6	14.4	0.5	9.4	75.7	3
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	96.3	23.4	4.8	86971.5	21.7	74.7	510.7	40	1.3	13.5	73.4	3
10	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	105.5	33.1	4.9	88781.3	21.7	83.8	589.9	17.2	0.5	6	80.5	3
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	105.2	32.2	4.9	88725.1	21.7	83.5	593	17.2	0.5	6	80.9	3
10	40	2	0.4	0.1	20	60	BB	BB	40	NG	107.7	34.9	5	89226.3	21.7	86	615.8	18	0.6	6.3	75.8	3
10	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	105	32.6	4.9	88678.6	21.7	83.3	585.5	18	0.6	6.3	80.6	3
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	104.7	31.7	4.9	88624	21.7	83	588.6	18	0.6	6.3	81.1	3
20	40	0.8	0.3	0.1	20	60	BB	BB	40	NG	90.6	17.9	4.8	85831.5	21.7	68.9	448.5	84.8	2.6	28	38.6	4
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	94	21.5	4.8	86501.8	21.7	72.3	482.4	76.1	2.4	25.5	41.5	4
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	94	20.9	4.8	86519.3	21.7	72.4	486.1	76.1	2.4	25.5	41.3	4
20	20	0.8	0.3	0.1	20	60	BB	BB	40	NG	91.1	18.4	4.8	85928.2	21.7	69.4	452.9	84.1	2.6	27.8	38.5	4
20	40	1.6	0.3	0.1	20	80	BB	BB	40	NG	90.4	17.8	4.8	85804.9	21.7	68.8	466.8	82	2.6	27.1	41.6	4
20	40	1.6	0.4	0.1	20	80	BB	BB	40	NG	90.7	17.3	4.8	85856	21.7	69	470	82	2.6	27.1	41.2	4
20	40	1.2	0.3	0.1	20	60	BB	BB	40	NG	93.5	21	4.8	86403	21.7	71.8	478	76.8	2.4	25.7	41.6	4
20	40	1.2	0.4	0.1	20	60	BB	BB	40	NG	93.6	20.4	4.8	86422.7	21.7	71.9	481.6	76.8	2.4	25.7	41.4	4
20	20	1.6	0.4	0.1	20	80	BB	BB	40	NG	91.2	17.8	4.8	85949.6	21.7	69.5	474.5	81.2	2.5	26.9	41.1	4
20	20	1.6	0.3	0.1	20	80	BB	BB	40	NG	90.9	18.3	4.8	85900.5	21.7	69.2	471.2	81.2	2.5	26.9	41.5	4

Low-Rise MURB - Highest NPV - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	141.3	59.6	13.3	238516.7	67.2	74.1	421	-7.2	-0.2	-0.6	107.9	1
10	40	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	140.5	58.8	13.1	236408.4	66.6	73.9	420	-6.3	-0.2	-0.5	108.1	1
10	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	138.9	64.1	12.9	231672.3	65.2	73.7	420.6	-2.9	-0.1	-0.2	106.8	1
10	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	121.3	50.7	5.1	91911.2	21.7	99.6	795.2	25.4	0.8	8.6	107.2	1
10	40	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	134	57.8	11.3	203586.9	56.5	77.4	428.8	-2	-0.1	-0.1	110.1	1
10	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	134.1	59.6	11.9	214453.6	60	74.1	421	-2.9	-0.1	-0.2	112.5	1
10	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	133.3	58.8	11.8	212345.3	59.4	73.9	420	-2	-0.1	-0.1	112.7	1
10	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	120.6	50.1	5.1	91772.7	21.7	98.9	789	26.3	0.8	8.9	107.6	1
10	40	2	0.3	0.1	20	60	FC	Condensing	40	NG	138.1	63.2	12.8	229550.8	64.6	73.6	419.6	-2	-0.1	-0.2	106.9	1
10	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	134.8	58.6	11.4	205654.3	57.1	77.6	429.8	-2.9	-0.1	-0.2	110	1
10	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	119.9	48.8	5.1	91629.3	21.7	98.2	794.6	26.3	0.8	8.8	108.8	2
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	107.8	36.7	5	89246.9	21.7	86.1	692.3	47.7	1.5	15.3	108.2	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	121.6	47.4	9.1	164672	44.9	76.7	426	18.5	0.6	1.1	105.3	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	119.7	47.2	9.5	170194.2	46.8	72.9	416.2	19.4	0.6	1.2	108.6	2
20	40	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	120.8	46.6	9	162654.2	44.3	76.5	425	19.4	0.6	1.2	105.4	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	108.5	37.4	5	89381	21.7	86.8	698.1	46.8	1.5	15.1	107.9	2
10	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	120.5	49.5	5.1	91766	21.7	98.9	800.7	25.4	0.8	8.6	108.5	2
20	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	109	38.4	5	89470.2	21.7	87.3	692.6	46.8	1.5	15.1	107.1	2
20	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	108.3	37.7	5	89333.8	21.7	86.6	686.9	47.7	1.5	15.4	107.4	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	120.5	48	9.6	172256.6	47.4	73.1	417.2	18.5	0.6	1.2	108.4	2
20	40	0.8	0.4	0.1	20	60	BB	BB	40	NG	99.6	28	4.9	87620.5	21.7	77.9	625.1	101.9	3.2	31.9	68.1	3
20	40	0.8	0.3	0.1	20	60	BB	BB	40	NG	99.6	28.7	4.9	87621.8	21.7	77.9	619.6	101.9	3.2	31.9	68.1	3
20	40	1.2	0.4	0.1	20	60	BB	BB	40	NG	103.7	32.4	4.9	88429.8	21.7	82	659.9	92.2	2.9	29.3	70.7	3
20	40	1.2	0.3	0.1	20	60	BB	BB	40	NG	103.9	33.2	4.9	88475.2	21.7	82.2	654.3	92.2	2.9	29.3	70.3	3
20	40	1.6	0.4	0.1	20	80	BB	BB	40	NG	100	28.4	4.9	87688.1	21.7	78.3	653.4	98.4	3.1	30.8	71	3
20	40	1.6	0.3	0.1	20	80	BB	BB	40	NG	100	29	4.9	87690.6	21.7	78.3	648	98.4	3.1	30.8	70.9	3
20	20	1.6	0.3	0.1	20	80	BB	BB	40	NG	100.6	29.7	4.9	87821.9	21.7	79	653.7	97.6	3	30.6	70.7	3
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	104.4	33	4.9	88562	21.7	82.7	665.6	91.3	2.9	29	70.5	3
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	104.6	33.9	4.9	88610	21.7	82.9	660	91.3	2.9	29.1	70	3
20	20	1.6	0.4	0.1	20	80	BB	BB	40	NG	100.6	29	4.9	87816.7	21.7	78.9	659.2	97.6	3	30.6	70.7	3
20	20	0.8	0.3	0.1	20	80	BB	BB	40	Elec	92	21.6	1	18221.5	0	92	586.8	151.8	4.7	21.5	20.7	4
20	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	100.8	21.4	6.1	110486.5	28.9	71.9	592.4	147.5	4.6	76.6	24	4
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	99.7	21	6.1	110270.6	28.9	70.8	581.1	148.4	4.6	76.6	25	4
20	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	100.2	20.8	6.1	110364	28.9	71.3	586.7	148.4	4.6	76.8	24.2	4
20	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	93.1	21.6	4.8	86333	21.7	71.4	586.8	151.8	4.7	46.4	29.5	4
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	93.6	21.4	4.8	86423.4	21.7	71.9	592.4	151.8	4.7	46.5	28.7	4
20	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	92.5	21	4.8	86207.6	21.7	70.8	581.1	152.6	4.8	46.6	29.7	4
20	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	92.9	20.8	4.8	86300.9	21.7	71.3	586.7	152.6	4.8	46.7	28.8	4
20	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	91.4	21	1	18096	0	91.4	581.1	152.6	4.8	21.6	20.9	4
20	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	100.3	21.6	6.1	110396.1	28.9	71.4	586.8	147.5	4.6	76.4	24.8	4

Low-Rise MURB - Highest NPV - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	138.8	72.3	11.6	208329.3	57.7	81	460.9	17.4	0.5	2.2	57.1	1
20	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	139.9	71.8	11.1	200069.6	55	84.9	470.5	17.4	0.5	2.1	53.9	1
10	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	155	86.4	14.4	259495.2	73.1	82	464.4	4.4	0.1	0.9	49.6	1
20	40	2	0.3	0.1	20	60	FC	Condensing	40	NG	143.4	76.6	12.5	225642.2	63	80.4	459.5	18.3	0.6	2.6	50.8	1
20	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	137.9	71.5	11.4	205951.7	57	80.9	460	18.3	0.6	2.3	57.4	1
20	40	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	139.1	70.9	11	197736.6	54.3	84.7	469.7	18.3	0.6	2.2	54.1	1
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	145.1	71.5	12.8	230014.8	64.3	80.9	460	14	0.4	2.1	52.7	1
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	146	72.3	12.9	232392.4	65	81	460.9	13.1	0.4	2	52.5	1
20	20	2	0.3	0.1	20	60	FC	Condensing	40	NG	144.2	77.5	12.7	228037.1	63.7	80.5	460.3	17.4	0.5	2.6	50.6	1
10	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	154.2	85.5	14.3	257091	72.3	81.8	463.6	5.2	0.2	1	49.9	1
20	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	133.1	55	6.5	116882.7	28.9	104.2	747.3	9.3	0.3	6.9	52	2
20	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	125.9	55	5.2	92819.6	21.7	104.2	747.3	13.6	0.4	5.1	56.6	2
20	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	132.7	54	6.5	116801	28.9	103.8	753.2	9.3	0.3	6.9	52.7	2
20	40	1.6	0.3	0.1	20	60	BB	BB	20	NG	132.3	54.2	6.5	116733.5	28.9	103.4	742.4	10.2	0.3	7.6	52.4	2
20	40	1.6	0.4	0.1	20	60	BB	BB	20	NG	131.9	53.2	6.5	116653.6	28.9	103	748.3	10.2	0.3	7.5	53.1	2
20	40	1.6	0.4	0.1	20	60	BB	BB	40	Elec	123.6	53.2	1.4	24479	0	123.6	748.3	14.4	0.5	2.2	49	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	125.5	54	5.2	92737.9	21.7	103.8	753.2	13.6	0.4	5.1	57.3	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	124.4	54	1.4	24626.4	0	124.4	753.2	13.6	0.4	2.1	48.6	2
20	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	125.1	54.2	5.1	92670.4	21.7	103.4	742.4	14.4	0.5	5.4	57	2
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	124.7	53.2	5.1	92590.6	21.7	103	748.3	14.4	0.5	5.4	57.7	2
20	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	107.3	35.5	5	89138	21.7	85.6	627.8	118.5	3.7	41.2	-16.3	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	113.8	34.8	6.3	113060.9	28.9	84.9	622.9	115.2	3.6	74.3	-20.6	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	118.8	39.4	6.3	114042.8	28.9	89.8	669.8	105.5	3.3	70.5	-19.5	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	118.6	39.9	6.3	114005.8	28.9	89.7	663.9	105.5	3.3	70.4	-19.2	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	111.3	39.9	5	89942.7	21.7	89.7	663.9	109.8	3.4	38.7	-14.5	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	111.5	39.4	5	89979.8	21.7	89.8	669.8	109.8	3.4	38.8	-14.9	3
20	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	114.5	35.5	6.3	113201.1	28.9	85.6	627.8	114.3	3.6	74.1	-20.9	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	106.6	34.8	4.9	88997.8	21.7	84.9	622.9	119.4	3.7	41.4	-16	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	107.7	35.2	5	89214.7	21.7	86	633.5	118.5	3.7	41.2	-17	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	107	34.5	4.9	89076.9	21.7	85.3	628.5	119.4	3.7	41.4	-16.6	3
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	175.9	5.5	25.8	-60.1	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	171.6	5.4	25.5	-67.7	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	171.6	5.4	101.9	-56	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	175.9	5.5	58.2	-51.4	4

Low-Rise MURB - Highest NPV - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	0.8	0.3	0.1	60	60	FC	Condensing	40	Elec	177.3	109.1	10.1	182578.2	47.1	130.3	572.8	-596.7	-18.6	-55.6	621	1
10	20	0.8	0.3	0.1	60	60	FC	Condensing	20	NG	186.6	110.2	15.4	277373.9	76.8	109.9	574	-603.5	-18.9	-110.5	626.3	1
10	40	0.8	0.3	0.1	60	60	FC	Condensing	20	NG	185.6	109.1	15.3	274752.8	76	109.7	572.8	-602.3	-18.8	-107.4	626.5	1
7	20	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	186	116	15.2	274190.1	75.8	110.3	575.6	-597.9	-18.7	-106	621.3	1
10	20	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	179.4	110.2	14.1	253310.8	69.5	109.9	574	-597.9	-18.7	-87.9	629.7	1
10	40	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	178.4	109.1	13.9	250689.7	68.8	109.7	572.8	-596.7	-18.6	-85.9	629.8	1
20	20	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	170.7	102.6	12.6	226180.4	61.4	109.2	571.8	-580.9	-18.1	-69.9	623.7	1
20	40	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	169.7	101.6	12.4	223566.1	60.7	109	570.5	-579.7	-18.1	-68.6	623.9	1
7	40	0.8	0.3	0.1	60	60	FC	Condensing	40	NG	185.1	114.9	15.1	271561.8	75	110.1	574.4	-596.7	-18.6	-103.2	621.4	1
10	20	0.8	0.3	0.1	60	60	FC	Condensing	40	Elec	178.3	110.2	10.3	185199.3	47.9	130.5	574	-597.9	-18.7	-56.5	620.9	1
20	20	0.8	0.3	0.1	20	60	BB	BB	20	NG	138.6	60	6.6	117971	28.9	109.7	813.7	87.6	2.7	61.4	-0.9	2
20	20	0.8	0.4	0.1	20	60	BB	BB	40	NG	131.4	59.3	5.2	93913.3	21.7	109.7	820.7	93.2	2.9	33.7	2.4	2
20	40	0.8	0.3	0.1	20	60	BB	BB	40	Elec	129.4	59.1	1.4	25617.4	0	129.4	806.6	94.4	2.9	14.4	-5.9	2
20	20	0.8	0.4	0.1	20	60	BB	BB	20	NG	138.6	59.3	6.6	117976.4	28.9	109.7	820.7	87.6	2.7	61.4	-0.9	2
20	40	0.8	0.3	0.1	20	60	BB	BB	20	NG	137.7	59.1	6.5	117792	28.9	108.8	806.6	88.8	2.8	61.8	-0.5	2
20	40	0.8	0.4	0.1	20	60	BB	BB	40	NG	130.5	58.4	5.2	93736.7	21.7	108.8	813.6	94.4	2.9	34	2.8	2
20	40	0.8	0.3	0.1	20	60	BB	BB	40	NG	130.5	59.1	5.2	93728.9	21.7	108.8	806.6	94.4	2.9	34	2.9	2
20	40	0.8	0.4	0.1	20	60	BB	BB	20	NG	137.7	58.4	6.5	117799.7	28.9	108.8	813.6	88.8	2.8	61.8	-0.6	2
20	40	0.8	0.4	0.1	20	60	BB	BB	40	Elec	129.4	58.4	1.4	25625.1	0	129.4	813.6	94.4	2.9	14.4	-6	2
20	20	0.8	0.3	0.1	20	60	BB	BB	40	NG	131.4	60	5.2	93907.9	21.7	109.7	813.7	93.2	2.9	33.7	2.5	2
20	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	129.8	49.9	6.5	116221.4	28.9	100.9	779.1	154	4.8	101	-52	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	128.4	49.3	6.4	115960.2	28.9	99.5	765.2	155.1	4.8	100.8	-50.9	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	120.1	49.3	1.3	23785.6	0	120.1	765.2	160.7	5	24.1	-56.3	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	122.5	49.9	5.1	92158.3	21.7	100.9	779.1	159.5	5	55.8	-48.6	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	121.2	49.3	5.1	91897.1	21.7	99.5	765.2	160.7	5	55.9	-47.5	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	121.7	49	5.1	91986.3	21.7	100	772	160.7	5	56	-48.3	3
40	40	0.8	0.4	0.1	20	60	BB	BB	40	NG	121.8	49.6	5.1	92010.1	21.7	100.1	738.6	166.5	5.2	58	-54.3	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	Elec	121.4	49.9	1.3	24046.8	0	121.4	779.1	159.5	5	24	-57.4	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	128.9	49	6.4	116049.4	28.9	100	772	155.1	4.8	101.2	-51.6	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	Elec	120.6	49	1.3	23874.8	0	120.6	772	160.7	5	24.2	-57	3
40	20	0.8	0.4	0.01	20	80	BB	BB	40	Elec	106	33.6	1.2	20987.4	0	106	606.6	233.3	7.3	34.2	-104.5	4
40	20	0.8	0.4	0.01	20	80	BB	BB	40	NG	107.1	33.6	4.9	89099	21.7	85.4	606.6	233.3	7.3	77	-95.7	4
40	40	0.8	0.4	0.01	20	80	BB	BB	40	Elec	105.2	32.8	1.2	20826.1	0	105.2	599.4	234.5	7.3	34.4	-104.2	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	105	32.4	4.9	88689.3	21.7	83.3	595.5	234.5	7.3	76.8	-93.3	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	Elec	104.8	33.3	1.2	20742.7	0	104.8	602.6	233.3	7.3	34.2	-102.4	4
40	40	0.8	0.4	0.01	20	80	BB	BB	40	NG	106.3	32.8	4.9	88937.6	21.7	84.6	599.4	234.5	7.3	77.1	-95.5	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	103.9	32.4	1.1	20577.8	0	103.9	595.5	234.5	7.3	34.3	-102.1	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	NG	105.8	33.3	4.9	88854.2	21.7	84.2	602.6	233.3	7.3	76.6	-93.6	4

Low-Rise MURB - Highest NPV - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	40	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	180.8	129.3	15.5	279598.3	77.8	103	590.4	18.9	0.6	3.2	33.1	1
20	40	1.6	0.3	0.1	20	60	BB	BB	40	NG	164.6	93.7	5.6	100481.7	21.7	142.9	946.9	13.9	0.4	5.5	30.8	1
20	40	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	179.8	129.5	16.1	289433.5	81	98.8	579.4	18.9	0.6	3.5	36.3	1
20	20	1.6	0.3	0.1	20	60	FC	Condensing	40	NG	180.9	130.6	16.3	292633.3	82	98.9	580.2	17.7	0.6	3.4	36.1	1
20	40	1.6	0.4	0.1	20	60	BB	BB	40	NG	164.2	92.7	5.6	100406.7	21.7	142.5	954.4	13.9	0.4	5.5	31.5	1
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	165.1	93.6	5.6	100597	21.7	143.5	960.7	12.7	0.4	5.1	31	1
20	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	165.5	94.7	5.6	100673.9	21.7	143.9	953.2	12.7	0.4	5.1	30.3	1
20	20	1.6	0.4	0.1	20	60	FC	Condensing	40	NG	181.9	130.4	15.7	282757.2	78.8	103.1	591.2	17.7	0.6	3.1	32.8	1
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	187	129.5	17.4	313496.6	88.3	98.8	579.4	13.3	0.4	3.3	33	1
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	188.1	130.6	17.6	316696.3	89.2	98.9	580.2	12.1	0.4	3.2	32.7	1
20	40	0.8	0.4	0.1	20	60	BB	BB	40	NG	149.6	77.8	5.4	97528.5	21.7	128	870	84.7	2.6	31.5	-14.2	2
20	40	0.8	0.3	0.1	20	60	BB	BB	40	NG	149.6	78.4	5.4	97516	21.7	127.9	862.4	84.7	2.6	31.5	-14.1	2
20	40	1.2	0.4	0.1	20	60	BB	BB	40	NG	157	85.3	5.5	98985.7	21.7	135.3	913.7	72.1	2.3	27.6	-14.3	2
20	40	1.2	0.3	0.1	20	60	BB	BB	40	NG	157.2	86.2	5.5	99018.6	21.7	135.5	906	72.1	2.3	27.7	-14.6	2
20	40	1.6	0.3	0.1	20	80	BB	BB	40	NG	153	81.8	5.5	98192.2	21.7	131.3	905.7	80.2	2.5	30.2	-15.5	2
20	20	0.8	0.4	0.1	20	60	BB	BB	40	NG	150.6	78.7	5.4	97717.6	21.7	128.9	876.4	83.5	2.6	31.2	-14.7	2
20	20	1.2	0.3	0.1	20	60	BB	BB	40	NG	158.1	87.1	5.5	99210.5	21.7	136.5	912.3	70.9	2.2	27.3	-15.1	2
20	20	1.2	0.4	0.1	20	60	BB	BB	40	NG	158	86.3	5.5	99175.6	21.7	136.3	920	70.9	2.2	27.3	-14.8	2
20	20	0.8	0.3	0.1	20	60	BB	BB	40	NG	150.6	79.4	5.4	97707.4	21.7	128.9	868.7	83.5	2.6	31.2	-14.6	2
20	40	1.6	0.4	0.1	20	80	BB	BB	40	NG	153	81.2	5.5	98197.7	21.7	131.4	913.2	80.2	2.5	30.3	-15.6	2
20	40	1.2	0.3	0.1	20	80	BB	BB	20	NG	153.2	74.6	6.7	120859	28.9	124.3	864.8	132.8	4.1	95.4	-64.9	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	NG	153.4	74.2	6.7	120913.3	28.9	124.5	872.5	132.8	4.1	95.6	-65.4	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	146.1	67.2	6.6	119448.4	28.9	117.1	821.2	145.4	4.5	98.8	-65.2	3
20	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	147	68.2	6.6	119635.8	28.9	118.1	827.6	144.3	4.5	98.8	-65.7	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	139.4	67	5.3	95490.7	21.7	117.7	828.8	151	4.7	53.9	-62.8	3
20	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	139.8	68.2	5.3	95572.7	21.7	118.1	827.6	149.8	4.7	53.6	-62.3	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	138.8	67.2	5.3	95385.4	21.7	117.1	821.2	151	4.7	53.8	-61.9	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	NG	146.2	74.2	5.4	96850.2	21.7	124.5	872.5	138.4	4.3	50.8	-62	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	140.3	68	5.3	95675.3	21.7	118.6	835.2	149.8	4.7	53.7	-63.2	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	NG	145.9	74.6	5.4	96795.9	21.7	124.3	864.8	138.4	4.3	50.7	-61.6	3
40	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	128.7	57	5.2	93388.2	21.7	107.1	746.6	223.1	7	76.4	-116.6	4
40	40	0.8	0.4	0.1	20	80	BB	BB	40	NG	129.6	57.1	5.2	93551.4	21.7	107.9	754.2	223.1	7	76.7	-118	4
40	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	129.7	58	5.2	93573.5	21.7	108	753	221.9	6.9	76.3	-117	4
40	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	127.7	57	1.4	25276.6	0	127.7	746.6	223.1	7	33.3	-125.3	4
40	40	0.8	0.4	0.1	20	80	BB	BB	20	NG	136.8	57.1	6.5	117614.5	28.9	107.9	754.2	217.5	6.8	138.3	-121.3	4
40	40	0.8	0.3	0.1	20	80	BB	BB	20	NG	136	57	6.5	117451.2	28.9	107.1	746.6	217.5	6.8	137.5	-119.9	4
40	20	0.8	0.4	0.1	20	80	BB	BB	20	NG	137.7	58	6.5	117796.6	28.9	108.8	760.6	216.4	6.8	138.4	-121.8	4
40	20	0.8	0.3	0.1	20	80	BB	BB	20	NG	136.9	58	6.5	117636.6	28.9	108	753	216.4	6.8	137.6	-120.4	4
40	20	0.8	0.4	0.1	20	80	BB	BB	40	NG	130.5	58	5.2	93733.5	21.7	108.8	760.6	221.9	6.9	76.5	-118.4	4
40	20	0.8	0.3	0.1	20	80	BB	BB	40	Elec	128.6	58	1.4	25462	0	128.6	753	221.9	6.9	33.2	-125.8	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	141.4	64	6.6	118523.5	28.9	112.5	631.8	-14	-0.4	-13.2	29.5	1
7	40	2.5	0.4	0.2	20	0	BB	BB	20	NG	139.6	61.7	6.6	118167.3	28.9	110.7	634.9	-13.2	-0.4	-12.3	31.9	1
7	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	140	62.2	6.6	118251.4	28.9	111.1	638.2	-14	-0.4	-13	31.9	1
7	20	2	0.3	0.2	20	0	BB	BB	20	NG	137.2	59.7	6.5	117695.9	28.9	108.3	607	-14	-0.4	-12.7	36.8	1
7	20	2	0.4	0.2	20	0	BB	BB	20	NG	135.9	58	6.5	117442.3	28.9	107	614.9	-14	-0.4	-12.5	39	1
7	20	1.6	0.3	0.2	20	0	BB	BB	20	NG	133.8	56.2	6.5	117024.8	28.9	104.9	584.9	-14	-0.4	-12.3	42.6	1
7	20	1.6	0.4	0.2	20	0	BB	BB	20	NG	132.6	54.6	6.5	116787	28.9	103.7	594.3	-14	-0.4	-12.1	44.7	1
7	40	2.5	0.3	0.2	20	0	BB	BB	20	NG	141	63.6	6.6	118438.8	28.9	112	628.5	-13.2	-0.4	-12.4	29.5	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	134.8	57.5	6.5	117229.2	28.9	105.9	578.6	-14	-0.4	-12.4	40.8	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	133.5	55.7	6.5	116956.9	28.9	104.6	589.6	-14	-0.4	-12.2	43.2	1
10	20	2	0.4	0.1	20	0	BB	BB	20	NG	123.1	45	6.4	114901.1	28.9	94.2	517.1	-12.6	-0.4	-10	59.7	2
10	20	1.6	0.3	0.1	20	0	BB	BB	20	NG	120.9	43.1	6.4	114464.3	28.9	92	489	-12.6	-0.4	-9.8	63.5	2
10	20	1.6	0.4	0.1	20	0	BB	BB	40	NG	112.7	41.7	5	90209.7	21.7	91	494.8	-8.9	-0.3	-3.4	70.4	2
10	20	1.6	0.3	0.1	20	0	BB	BB	40	NG	113.7	43.1	5	90401.2	21.7	92	489	-8.9	-0.3	-3.4	68.7	2
10	20	2	0.4	0.1	20	0	BB	BB	40	NG	115.9	45	5	90838	21.7	94.2	517.1	-8.9	-0.3	-3.4	64.9	2
10	40	1.6	0.4	0.1	20	0	BB	BB	20	NG	119.5	41.2	6.3	114189.7	28.9	90.6	491.6	-11.8	-0.4	-9.1	65.1	2
10	40	1.6	0.3	0.1	20	0	BB	BB	20	NG	120.5	42.7	6.4	114380.3	28.9	91.6	485.7	-11.8	-0.4	-9.2	63.5	2
10	40	2	0.4	0.1	20	0	BB	BB	20	NG	122.7	44.6	6.4	114817.9	28.9	93.8	513.9	-11.8	-0.4	-9.4	59.7	2
10	20	1.6	0.4	0.1	20	0	BB	BB	20	NG	119.9	41.7	6.3	114272.7	28.9	91	494.8	-12.6	-0.4	-9.7	65.2	2
10	40	2	0.4	0.1	20	0	BB	BB	40	NG	115.4	44.6	5	90754.8	21.7	93.8	513.9	-8.1	-0.3	-3.1	64.9	2
10	40	1.6	0.3	0.2	20	60	FC	Condensing	20	Elec	115	29.5	5	90170.9	21.5	93.4	311.5	16.3	0.5	1.2	50.8	3
10	40	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	111.2	23.5	3.6	65222.2	13.8	97.4	329.6	17.7	0.6	1.2	52.2	3
10	40	1.6	0.4	0.2	20	60	FC	Condensing	20	Elec	116.1	28.5	4.7	84179.2	19.5	96.6	329.9	16.3	0.5	1.2	47.9	3
10	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	109.6	24.1	3.9	70099.2	15.5	94.2	308.9	17.7	0.6	1.2	55.7	3
10	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	111.6	23.9	3.7	66406.2	14.1	97.5	320.4	16.9	0.5	1.1	52.4	3
10	20	2	0.3	0.1	20	60	FC	Condensing	20	Elec	112.7	27.2	4.5	81517.2	18.9	93.8	309.6	16.9	0.5	1.2	52.8	3
10	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	110	24.6	4	71316.7	15.8	94.2	308.9	16.9	0.5	1.1	55.9	3
10	20	1.6	0.3	0.2	20	60	FC	Condensing	20	Elec	115.4	29.9	5.1	91421.5	21.9	93.5	308.6	15.5	0.5	1.1	51	3
10	20	2	0.4	0.1	20	60	FC	Condensing	20	Elec	114	26.4	4.2	76082.2	17.1	97	319.8	16.9	0.5	1.2	49.6	3
10	20	1.6	0.4	0.2	20	60	FC	Condensing	20	Elec	116.5	28.9	4.7	85400.3	19.9	96.6	320.9	15.5	0.5	1.1	48.1	3
20	40	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	91.5	13.6	1.7	29797	3.7	87.8	301.5	93.1	2.9	5.5	5.7	4
20	20	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	98.8	14	1.8	32238.9	4	94.8	300.2	88.6	2.8	5.2	-2.2	4
20	20	0.8	0.3	0.1	20	60	FC	Condensing	20	Elec	99.2	14.2	1.8	32845.6	4.2	95	302.4	91.6	2.9	5.4	-5.8	4
20	40	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	98.4	13.6	1.7	31156.3	3.7	94.7	301.5	89.4	2.8	5.3	-2.5	4
20	40	0.8	0.3	0.1	20	60	FC	Condensing	20	Elec	98.8	13.8	1.8	31735.2	3.9	94.9	304	92.3	2.9	5.5	-6	4
40	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	98.7	14.8	2	36375.7	5.4	93.3	295.7	93.2	2.9	5.6	-6	4
20	20	1.6	0.3	0.1	20	80	FC	Condensing	40	Elec	91.9	14	1.7	30879.7	4	87.9	300.2	92.3	2.9	5.4	5.9	4
20	20	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	94.6	14.1	1.6	28865.4	3.2	91.4	315.1	92.3	2.9	5.4	0.9	4
20	20	0.8	0.4	0.1	20	60	FC	Condensing	40	Elec	95	14.3	1.6	29406	3.4	91.6	316.2	95.3	3	5.6	-2.6	4
20	40	1.6	0.4	0.1	20	80	FC	Condensing	40	Elec	94.2	13.7	1.5	27833.4	2.9	91.3	313.5	93.1	2.9	5.4	0.7	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2	0.3	0.2	20	0	BB	BB	20	NG	154.7	75.6	6.7	121159.1	28.9	125.8	853.8	-12.5	-0.4	-11.7	28.8	1
7	20	1.6	0.3	0.2	20	0	BB	BB	20	NG	151	71.9	6.7	120426.2	28.9	122.1	827.4	-12.5	-0.4	-11.3	35.2	1
10	20	2	0.4	0.2	20	0	BB	BB	20	NG	145.9	66.4	6.6	119414.6	28.9	117	799.6	-12.5	-0.4	-10.8	44	1
10	20	2	0.3	0.2	20	0	BB	BB	20	NG	147.1	68.2	6.6	119663.3	28.9	118.2	796.6	-12.5	-0.4	-10.9	41.8	1
10	20	2.5	0.4	0.2	20	0	BB	BB	20	NG	150.2	70.9	6.7	120279.7	28.9	121.3	831.7	-12.5	-0.4	-11.2	36.4	1
10	20	2.5	0.3	0.2	20	0	BB	BB	20	NG	151.6	72.8	6.7	120544.8	28.9	122.7	828.7	-12.5	-0.4	-11.4	34.1	1
7	40	2	0.4	0.2	20	0	BB	BB	20	NG	152.9	73.3	6.7	120801.2	28.9	124	852.4	-11.8	-0.4	-10.8	31.2	1
7	40	2	0.3	0.2	20	0	BB	BB	20	NG	154.1	75.1	6.7	121050.8	28.9	125.2	849.5	-11.8	-0.4	-11	29	1
7	20	1.6	0.4	0.2	20	0	BB	BB	20	NG	149.8	70.2	6.7	120188.2	28.9	120.9	830.4	-12.5	-0.4	-11.2	37.2	1
7	20	2	0.4	0.2	20	0	BB	BB	20	NG	153.4	73.8	6.7	120908.8	28.9	124.5	856.7	-12.5	-0.4	-11.6	31	1
10	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	124.5	37.6	5.6	100298.6	24.2	100.4	351	17.6	0.5	1.2	65.2	2
10	40	2	0.3	0.1	20	60	FC	Condensing	20	Elec	127.8	40.7	6.2	111835.5	27.6	100.1	351.1	17.6	0.5	1.2	61.3	2
10	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	126.6	37.4	5.3	95897.4	22.6	104	359	16.8	0.5	1.1	61.6	2
10	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	125.1	38.2	5.7	101797.3	24.6	100.5	352	16.8	0.5	1.1	65.1	2
10	20	2	0.4	0.1	20	60	FC	Condensing	20	Elec	129.7	40.4	5.9	107004.4	26	103.7	359.1	16.8	0.5	1.1	58	2
10	40	2	0.4	0.1	20	60	FC	Condensing	20	Elec	129.1	39.8	5.9	105523.4	25.5	103.5	358.1	17.6	0.5	1.2	58	2
10	40	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	126	36.9	5.2	94434.5	22.2	103.8	358.1	17.6	0.5	1.1	61.7	2
10	20	1.6	0.4	0.2	20	60	FC	Condensing	40	Elec	126.3	43.6	6.6	117960	29.7	96.6	359.1	19.1	0.6	1.4	63.4	2
10	20	1.6	0.4	0.1	20	60	FC	Condensing	40	Elec	119.7	37.4	5.3	94538.2	22.6	97.1	359	20.4	0.6	1.3	69.9	2
10	20	2	0.3	0.1	20	60	FC	Condensing	20	Elec	128.4	41.3	6.3	113347.3	28.1	100.3	352.1	16.8	0.5	1.2	61.2	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	114.8	29.7	4	72234.1	15.8	99	346.6	39.7	1.2	2.4	55.8	3
20	40	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	116.6	29.2	3.7	67248.3	14.1	102.5	354	39.7	1.2	2.3	51.9	3
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	117.2	29.8	3.8	68665.6	14.5	102.7	354.9	38.9	1.2	2.3	51.8	3
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	115.4	30.3	4.1	73690.2	16.2	99.1	347.5	38.9	1.2	2.4	55.8	3
10	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	111	32.2	1.2	21972.8	0	111	593	13.7	0.4	2.1	63.9	3
10	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	111.3	33.1	1.2	22029	0	111.3	589.9	13.7	0.4	2.1	63.4	3
10	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	110.5	31.7	1.2	21871.7	0	110.5	588.6	14.4	0.5	2.2	64	3
10	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	110.7	32.6	1.2	21926.3	0	110.7	585.5	14.4	0.5	2.2	63.5	3
10	40	2	0.4	0.1	20	60	BB	BB	20	Elec	113.5	34.9	1.2	22474	0	113.5	615.8	14.4	0.5	2.2	58.8	3
20	20	2	0.4	0.1	20	60	FC	Condensing	20	Elec	119.9	32.5	4.4	78814	17.6	102.3	354.9	38.9	1.2	2.4	48.6	3
20	20	0.8	0.3	0.1	20	80	FC	Condensing	20	Elec	105.4	19.8	1.9	34759.1	4.4	101	348	125.6	3.9	6.7	-19.6	4
20	20	0.8	0.4	0.1	20	80	FC	Condensing	20	Elec	108.4	20.2	1.8	32698.9	3.6	104.8	356	125.6	3.9	6.7	-25.1	4
20	40	1.2	0.3	0.1	20	80	FC	Condensing	40	Elec	100	21.5	2.2	40344	6.6	93.4	346.9	121.9	3.8	6.6	-5.4	4
20	40	1.2	0.3	0.1	20	80	FC	Condensing	20	Elec	106.8	21.5	2.3	41703.3	6.6	100.3	346.9	118.4	3.7	6.5	-13.7	4
20	40	1.2	0.4	0.1	20	80	FC	Condensing	20	Elec	109.4	21.6	2.2	38753.8	5.5	103.9	354.3	118.4	3.7	6.4	-18.7	4
20	40	0.8	0.3	0.1	20	80	FC	Condensing	20	Elec	104.9	19.3	1.9	33461.4	4.1	100.9	347.1	126.4	3.9	6.7	-19.6	4
20	40	0.8	0.4	0.1	20	80	FC	Condensing	20	Elec	107.8	19.6	1.7	31448.7	3.2	104.6	355.1	126.4	3.9	6.7	-25.1	4
40	20	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	107.9	20.9	2	36630.6	4.9	103	352.4	126.5	4	6.8	-24.5	4
40	40	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	107.4	20.4	2	35350.8	4.5	102.9	351.5	127.2	4	6.8	-24.5	4
20	40	1.2	0.4	0.1	20	80	FC	Condensing	40	Elec	102.5	21.6	2.1	37394.5	5.5	97.1	354.3	121.9	3.8	6.6	-10.4	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.3	0.2	20	0	FC	Condensing	20	NG	196.5	110.3	23.8	429177.8	124.6	71.9	418.8	-38	-1.2	-24.8	71.7	1
10	20	2.5	0.4	0.2	20	0	FC	Condensing	20	NG	196	108.7	23.2	417503.9	120.9	75.1	428.5	-38.8	-1.2	-17.9	71.5	1
10	20	2.5	0.3	0.2	20	0	FC	Condensing	20	NG	197.3	111.1	24	431394.8	125.3	72	419.8	-38.8	-1.2	-27.7	71.5	1
7	40	1.6	0.3	0.2	20	0	FC	Condensing	20	NG	195.9	109.1	23.5	422899.5	122.6	73.3	422.5	-38	-1.2	-20.2	71.6	1
7	40	2	0.4	0.2	20	0	FC	Condensing	20	NG	200.5	111.9	23.8	428879	124.3	76.2	430.7	-38	-1.2	-24.6	64.6	1
7	40	2.5	0.3	0.1	20	0	FC	Condensing	20	NG	196.9	110	23.7	426765.5	123.8	73.1	421.6	-36.4	-1.1	-21.9	69	1
10	40	2.5	0.4	0.2	20	0	FC	Condensing	20	NG	195.2	107.9	23.1	415291.4	120.3	75	427.5	-38	-1.2	-16.5	71.7	1
7	20	2	0.4	0.2	20	0	FC	Condensing	20	NG	201.3	112.7	23.9	431064	124.9	76.4	431.7	-38.8	-1.2	-27.3	64.4	1
7	20	2.5	0.3	0.1	20	0	FC	Condensing	20	NG	197.7	110.8	23.8	428956.3	124.5	73.2	422.6	-37.3	-1.2	-24.2	68.7	1
7	20	1.6	0.3	0.2	20	0	FC	Condensing	20	NG	196.8	109.9	23.6	425107.4	123.3	73.5	423.5	-38.8	-1.2	-22.2	71.4	1
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	127.4	47.4	5.4	97919.7	23.2	104.2	426	14.3	0.4	0.7	88.9	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	126.3	48	5.9	105504.4	25.7	100.5	417.2	14.3	0.4	0.7	92.1	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	40	Elec	118.6	47.2	5.7	102082.7	25.1	93.5	416.2	19.4	0.6	1	99.8	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	40	Elec	120.5	47.4	5.4	96560.5	23.2	97.3	426	18.5	0.6	0.9	96.5	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	40	Elec	119.4	48	5.8	104145.1	25.7	93.7	417.2	18.5	0.6	0.9	99.7	2
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	NG	128.8	47.4	10.5	188735.1	52.1	76.7	426	14.3	0.4	1	100.6	2
20	40	1.6	0.4	0.1	20	60	FC	Condensing	40	Elec	119.7	46.6	5.3	94542.7	22.6	97.1	425	19.4	0.6	1	96.7	2
20	40	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	125.5	47.2	5.7	103441.9	25.1	100.4	416.2	15.1	0.5	0.8	92.3	2
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	NG	127.7	48	10.9	196319.7	54.6	73.1	417.2	14.3	0.4	1	103.8	2
20	40	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	126.6	46.6	5.3	95901.9	22.6	104	425	15.1	0.5	0.8	89.1	2
40	40	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	113.2	33.7	2.7	48962.6	8.5	104.7	422.6	121.1	3.8	5.3	-0.7	3
40	40	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	111	33.6	3	53573.7	10.1	100.9	413.7	121.1	3.8	5.4	4	3
20	20	0.8	0.4	0.1	20	80	FC	Condensing	40	Elec	106.8	33.2	2.4	42578.6	6.8	99.9	427.4	123.5	3.9	5.4	7.2	3
40	20	1.6	0.4	0.1	20	80	FC	Condensing	20	Elec	113.9	34.5	2.8	50825	9	104.9	423.6	120.2	3.8	5.3	-0.7	3
40	20	1.6	0.3	0.1	20	80	FC	Condensing	20	Elec	111.7	34.3	3.1	55481	10.7	101	414.7	120.2	3.8	5.4	3.9	3
20	40	0.8	0.4	0.1	20	80	FC	Condensing	20	Elec	113	32.5	2.3	42120.8	6.3	106.6	426.4	120.1	3.8	5.2	-0.3	3
20	40	0.8	0.3	0.1	20	80	FC	Condensing	20	Elec	110.3	32	2.5	45684.2	7.6	102.7	417.3	120.1	3.8	5.3	4.9	3
20	40	0.8	0.4	0.1	20	80	FC	Condensing	40	Elec	106.1	32.5	2.3	40761.6	6.3	99.8	426.4	124.4	3.9	5.4	7.2	3
20	20	0.8	0.3	0.1	20	80	FC	Condensing	20	Elec	111	32.8	2.6	47567.1	8.2	102.9	418.3	119.2	3.7	5.2	4.8	3
20	20	0.8	0.4	0.1	20	80	FC	Condensing	20	Elec	113.7	33.2	2.4	43937.9	6.8	106.8	427.4	119.2	3.7	5.2	-0.4	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	Elec	91.9	20.8	1	18189.4	0	91.9	586.7	152.6	4.8	21.6	20.1	4
20	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	91.4	21	1	18096	0	91.4	581.1	152.6	4.8	21.6	20.9	4
20	20	0.8	0.4	0.1	20	80	BB	BB	40	Elec	92.5	21.4	1	18311.9	0	92.5	592.4	151.8	4.7	21.5	19.9	4
20	20	0.8	0.3	0.1	20	80	BB	BB	40	Elec	92	21.6	1	18221.5	0	92	586.8	151.8	4.7	21.5	20.7	4
40	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	97.5	19.7	1.1	19314.2	0	97.5	566.9	193	6	27.6	-30.1	4
40	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	97	19.9	1.1	19215.3	0	97	561.2	193	6	27.6	-29.2	4
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	98.7	20.8	1.1	19548.6	0	98.7	586.7	148.4	4.6	21.3	12.5	4
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	98.3	21	1.1	19455.3	0	98.3	581.1	148.4	4.6	21.2	13.3	4
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	99.3	21.4	1.1	19671.1	0	99.3	592.4	147.5	4.6	21.2	12.3	4
20	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	98.9	21.6	1.1	19580.8	0	98.9	586.8	147.5	4.6	21.1	13.1	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	1.6	0.4	0.2	20	60	BB	BB	20	NG	157	78.6	6.8	121609.6	28.9	128.1	936.3	-4.4	-0.1	-4.1	24.5	1
10	40	1.6	0.3	0.2	20	60	BB	BB	20	NG	157.9	80	6.8	121789.6	28.9	129	930.4	-4.4	-0.1	-4.2	22.9	1
10	20	1.6	0.3	0.2	20	60	BB	BB	20	NG	158.6	80.8	6.8	121942.1	28.9	129.7	935.3	-5.3	-0.2	-5.1	22.5	1
10	20	2	0.4	0.1	20	60	BB	BB	20	NG	152.3	73.9	6.7	120694.1	28.9	123.4	898.8	-3.7	-0.1	-3.3	31.8	1
10	20	2	0.3	0.1	20	60	BB	BB	20	NG	153.1	75.2	6.7	120853	28.9	124.2	893	-3.7	-0.1	-3.4	30.4	1
10	20	2.5	0.4	0.1	20	60	BB	BB	20	NG	158.8	80.5	6.8	121977	28.9	129.9	944	-3.7	-0.1	-3.5	20.6	1
10	20	1.6	0.4	0.2	20	60	BB	BB	20	NG	157.7	79.3	6.8	121760.9	28.9	128.8	941.2	-5.3	-0.2	-5	24.1	1
7	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	159.2	81.1	6.8	122053.1	28.9	130.3	938.1	-3.7	-0.1	-3.6	19.9	1
7	20	1.6	0.4	0.1	20	60	BB	BB	20	NG	158.4	79.8	6.8	121889.9	28.9	129.5	944	-3.7	-0.1	-3.5	21.3	1
10	20	1.6	0.3	0.1	20	60	BB	BB	20	NG	147.7	69.6	6.7	119776	28.9	118.8	855.3	-3.7	-0.1	-3.2	39.8	1
20	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	130.9	54.2	1.4	25918.1	0	130.9	742.4	10.2	0.3	1.6	40.7	2
20	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	130.5	53.2	1.4	25838.3	0	130.5	748.3	10.2	0.3	1.6	41.4	2
20	40	1.6	0.4	0.1	20	60	BB	BB	40	Elec	123.6	53.2	1.4	24479	0	123.6	748.3	14.4	0.5	2.2	49	2
20	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	131.2	54	1.4	25985.6	0	131.2	753.2	9.3	0.3	1.5	41	2
20	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	131.6	55	1.4	26067.3	0	131.6	747.3	9.3	0.3	1.5	40.3	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	NG	125.5	54	5.2	92737.9	21.7	103.8	753.2	13.6	0.4	5.1	57.3	2
20	20	1.6	0.3	0.1	20	60	BB	BB	40	NG	125.9	55	5.2	92819.6	21.7	104.2	747.3	13.6	0.4	5.1	56.6	2
20	20	1.6	0.3	0.1	20	60	BB	BB	40	Elec	124.8	55	1.4	24708.1	0	124.8	747.3	13.6	0.4	2.1	47.8	2
20	20	1.6	0.4	0.1	20	60	BB	BB	40	Elec	124.4	54	1.4	24626.4	0	124.4	753.2	13.6	0.4	2.1	48.6	2
20	40	1.6	0.3	0.1	20	60	BB	BB	40	Elec	124	54.2	1.4	24558.9	0	124	742.4	14.4	0.5	2.2	48.3	2
40	20	1.6	0.4	0.1	20	80	BB	BB	20	Elec	115.5	37.7	1.3	22879	0	115.5	653.3	115.3	3.6	17.6	-37.9	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	110.3	39.9	1.2	21831.2	0	110.3	663.9	109.8	3.4	16.6	-23.3	3
40	20	1.6	0.3	0.1	20	80	BB	BB	20	Elec	115.4	38.2	1.3	22844.5	0	115.4	647.5	115.3	3.6	17.6	-37.6	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	112.7	34.5	1.2	22324.6	0	112.7	628.5	115.2	3.6	17.5	-33	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	112.3	34.8	1.2	22245.5	0	112.3	622.9	115.2	3.6	17.5	-32.3	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	117.3	39.4	1.3	23227.5	0	117.3	669.8	105.5	3.3	16.1	-31.2	3
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	113.4	35.2	1.2	22462.4	0	113.4	633.5	114.3	3.6	17.4	-33.3	3
20	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	113.1	35.5	1.2	22385.7	0	113.1	627.8	114.3	3.6	17.3	-32.6	3
20	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	110.4	39.4	1.2	21868.2	0	110.4	669.8	109.8	3.4	16.6	-23.6	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	117.1	39.9	1.3	23190.4	0	117.1	663.9	105.5	3.3	16.1	-30.9	3
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	93.3	21.8	1	18471	0	93.3	486.1	175.9	5.5	25.8	-60.1	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	Elec	100.1	21.8	1.1	19830.2	0	100.1	486.1	171.6	5.4	25.5	-67.7	4
40	40	0.8	0.3	0.01	20	80	BB	BB	20	NG	101.6	21.8	6.1	110645.6	28.9	72.7	486.1	171.6	5.4	101.9	-56	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	94.4	21.8	4.8	86582.5	21.7	72.7	486.1	175.9	5.5	58.2	-51.4	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
40	40	1.2	0.3	0.2	60	60	FC	Condensing	20	NG	202.2	126	19	342018.8	96.4	105.8	566.6	-515.3	-16.1	-275.5	520.9	1
7	20	1.2	0.3	0.1	60	80	FC	Condensing	20	NG	200.8	122.9	18.1	326650	91.6	109.2	573.2	-537.1	-16.8	-197.2	542.9	1
20	20	1.2	0.3	0.2	60	80	FC	Condensing	20	NG	198	121.5	18	323456.8	90.8	107.2	569.2	-522.2	-16.3	-180	532.4	1
20	20	1.6	0.3	0.1	60	80	FC	Condensing	20	NG	201.8	125.2	18.8	338079.8	95.2	106.6	568.1	-520.1	-16.2	-249	525.9	1
10	40	0.8	0.3	0.2	60	60	FC	Condensing	20	NG	198.3	121.1	17.8	319774.2	89.6	108.8	572.7	-604.4	-18.9	-194.6	613.3	1
10	40	1.2	0.3	0.1	60	60	FC	Condensing	20	NG	203.3	126	18.9	339651.5	95.6	107.7	570.5	-602.3	-18.8	-300.9	605.6	1
10	20	0.8	0.3	0.2	60	60	FC	Condensing	20	NG	199.3	122.2	17.9	322435.2	90.3	109	573.9	-605.6	-18.9	-204.7	613.1	1
7	40	1.2	0.3	0.1	60	80	FC	Condensing	20	NG	199.8	121.9	18	324037.8	90.8	109	572	-536	-16.7	-186.8	543	1
7	40	1.2	0.3	0.1	40	60	FC	Condensing	20	NG	200.1	125.8	19.5	350114.2	99.1	101	554.1	-282.5	-8.8	-198.8	293	1
20	40	1.6	0.3	0.1	60	80	FC	Condensing	20	NG	200.8	124.1	18.6	335451.5	94.4	106.4	566.9	-519	-16.2	-232.2	526	1
20	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	133.4	56	1.5	26423.1	0	133.4	814.4	141.4	4.4	21.7	-60.7	2
20	40	0.8	0.4	0.1	20	60	BB	BB	40	Elec	129.4	58.4	1.4	25625.1	0	129.4	813.6	94.4	2.9	14.4	-6	2
20	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	133.7	55.5	1.5	26467.4	0	133.7	821.4	141.4	4.4	21.7	-61.3	2
20	40	0.8	0.3	0.1	20	60	BB	BB	40	Elec	129.4	59.1	1.4	25617.4	0	129.4	806.6	94.4	2.9	14.4	-5.9	2
20	20	0.8	0.3	0.1	20	60	BB	BB	20	Elec	137.1	60	1.5	27155.6	0	137.1	813.7	87.6	2.7	13.5	-16.6	2
20	20	0.8	0.4	0.1	20	60	BB	BB	40	Elec	130.3	59.3	1.4	25801.8	0	130.3	820.7	93.2	2.9	14.2	-6.3	2
20	20	0.8	0.3	0.1	20	60	BB	BB	40	Elec	130.3	60	1.4	25796.4	0	130.3	813.7	93.2	2.9	14.2	-6.3	2
20	20	0.8	0.4	0.1	20	60	BB	BB	20	Elec	137.2	59.3	1.5	27161.1	0	137.2	820.7	87.6	2.7	13.5	-16.6	2
20	40	0.8	0.3	0.1	20	60	BB	BB	20	Elec	136.2	59.1	1.5	26976.7	0	136.2	806.6	88.8	2.8	13.7	-15.4	2
20	40	0.8	0.4	0.1	20	60	BB	BB	20	Elec	136.3	58.4	1.5	26984.4	0	136.3	813.6	88.8	2.8	13.7	-15.5	2
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	128.3	49.9	1.4	25406.1	0	128.3	779.1	154	4.8	23.4	-63.6	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	127	49.3	1.4	25144.9	0	127	765.2	155.1	4.8	23.6	-62.5	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	127.4	49	1.4	25234	0	127.4	772	155.1	4.8	23.6	-63.3	3
40	20	1.2	0.3	0.1	20	80	BB	BB	20	Elec	124.9	47.4	1.4	24731.7	0	124.9	740.3	213.5	6.7	32.3	-117.3	3
40	20	1.2	0.4	0.1	20	80	BB	BB	20	Elec	125.3	47.1	1.4	24819	0	125.3	747.2	213.5	6.7	32.3	-118	3
40	40	0.8	0.4	0.1	20	60	BB	BB	20	Elec	127.6	49.6	1.4	25257.8	0	127.6	738.6	160.9	5	24.5	-69.3	3
20	20	0.8	0.4	0.1	20	80	BB	BB	40	Elec	121.4	49.9	1.3	24046.8	0	121.4	779.1	159.5	5	24	-57.4	3
20	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	120.1	49.3	1.3	23785.6	0	120.1	765.2	160.7	5	24.1	-56.3	3
20	40	0.8	0.4	0.1	20	80	BB	BB	40	Elec	120.6	49	1.3	23874.8	0	120.6	772	160.7	5	24.2	-57	3
40	40	0.8	0.4	0.1	20	60	BB	BB	40	Elec	120.7	49.6	1.3	23898.6	0	120.7	738.6	166.5	5.2	25	-63	3
40	40	0.8	0.4	0.01	20	80	BB	BB	40	Elec	105.2	32.8	1.2	20826.1	0	105.2	599.4	234.5	7.3	34.4	-104.2	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	Elec	103.9	32.4	1.1	20577.8	0	103.9	595.5	234.5	7.3	34.3	-102.1	4
40	20	0.8	0.4	0.01	20	80	BB	BB	40	Elec	106	33.6	1.2	20987.4	0	106	606.6	233.3	7.3	34.2	-104.5	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	Elec	104.8	33.3	1.2	20742.7	0	104.8	602.6	233.3	7.3	34.2	-102.4	4
40	40	0.8	0.4	0.01	20	80	BB	BB	40	NG	106.3	32.8	4.9	88937.6	21.7	84.6	599.4	234.5	7.3	77.1	-95.5	4
40	40	0.8	0.3	0.01	20	80	BB	BB	40	NG	105	32.4	4.9	88689.3	21.7	83.3	595.5	234.5	7.3	76.8	-93.3	4
40	20	0.8	0.4	0.01	20	80	BB	BB	40	NG	107.1	33.6	4.9	89099	21.7	85.4	606.6	233.3	7.3	77	-95.7	4
40	20	0.8	0.3	0.01	20	80	BB	BB	40	NG	105.8	33.3	4.9	88854.2	21.7	84.2	602.6	233.3	7.3	76.6	-93.6	4

Low-Rise MURB - Lowest Cost of GHG Abatement - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	1.6	0.3	0.1	20	60	FC	Condensing	20	Elec	186.7	130.6	12.5	225881	60.3	126.4	580.2	12.1	0.4	1.4	21	1
20	20	1.6	0.4	0.1	20	60	FC	Condensing	20	Elec	187.7	130.4	12	216005	57.1	130.6	591.2	12.1	0.4	1.3	17.8	1
20	40	1.6	0.4	0.1	20	60	BB	BB	20	Elec	170	92.7	1.9	33654.4	0	170	954.4	8.3	0.3	1.3	16.5	1
20	40	1.6	0.3	0.1	20	60	BB	BB	20	Elec	170.3	93.7	1.9	33729.4	0	170.3	946.9	8.3	0.3	1.3	15.8	1
20	40	2	0.3	0.1	20	60	BB	BB	20	Elec	177.5	101	2	35146.3	0	177.5	985.1	8.3	0.3	1.4	3.5	1
20	40	2	0.4	0.1	20	60	BB	BB	20	Elec	176.9	99.8	1.9	35037	0	176.9	992.5	8.3	0.3	1.4	4.4	1
20	20	1.6	0.4	0.1	20	60	BB	BB	20	Elec	170.9	93.6	1.9	33844.8	0	170.9	960.7	7.2	0.2	1.1	16	1
20	20	1.6	0.3	0.1	20	60	BB	BB	20	Elec	171.3	94.7	1.9	33921.7	0	171.3	953.2	7.2	0.2	1.1	15.3	1
20	20	2	0.4	0.1	20	60	BB	BB	20	Elec	177.9	100.8	2	35227.7	0	177.9	998.8	7.2	0.2	1.2	3.9	1
20	20	2	0.3	0.1	20	60	BB	BB	20	Elec	178.5	102	2	35338.7	0	178.5	991.4	7.2	0.2	1.2	2.9	1
20	20	1.2	0.3	0.1	20	60	BB	BB	20	Elec	163.9	87.1	1.8	32458.2	0	163.9	912.3	65.3	2	10.4	-30.1	2
20	20	1.6	0.4	0.1	20	80	BB	BB	20	Elec	159.8	82.1	1.8	31632.8	0	159.8	919.5	73.5	2.3	11.6	-31.1	2
20	20	1.6	0.3	0.1	20	80	BB	BB	20	Elec	159.7	82.8	1.8	31629.3	0	159.7	912	73.5	2.3	11.6	-31.1	2
20	40	1.2	0.3	0.1	20	60	BB	BB	20	Elec	163	86.2	1.8	32266.3	0	163	906	66.5	2.1	10.5	-29.6	2
20	40	1.2	0.4	0.1	20	60	BB	BB	40	Elec	155.9	85.3	1.7	30874.2	0	155.9	913.7	72.1	2.3	11.3	-23.1	2
20	40	1.2	0.3	0.1	20	60	BB	BB	40	Elec	156.1	86.2	1.7	30907.1	0	156.1	906	72.1	2.3	11.3	-23.4	2
20	20	1.2	0.4	0.1	20	60	BB	BB	40	Elec	156.9	86.3	1.7	31064.1	0	156.9	920	70.9	2.2	11.1	-23.6	2
20	20	1.2	0.3	0.1	20	60	BB	BB	40	Elec	157.1	87.1	1.7	31099	0	157.1	912.3	70.9	2.2	11.1	-23.9	2
20	20	1.2	0.4	0.1	20	60	BB	BB	20	Elec	163.7	86.3	1.8	32423.4	0	163.7	920	65.3	2	10.4	-29.8	2
20	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	162.8	85.3	1.8	32233.5	0	162.8	913.7	66.5	2.1	10.5	-29.3	2
20	40	1.2	0.4	0.1	20	80	BB	BB	40	Elec	145.1	74.2	1.6	28738.7	0	145.1	872.5	138.4	4.3	21.3	-70.8	3
20	40	1.2	0.3	0.1	20	80	BB	BB	40	Elec	144.9	74.6	1.6	28684.4	0	144.9	864.8	138.4	4.3	21.2	-70.3	3
20	40	1.2	0.4	0.1	20	80	BB	BB	20	Elec	152	74.2	1.7	30097.9	0	152	872.5	132.8	4.1	20.6	-77.1	3
20	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	145.1	67	1.6	28738.5	0	145.1	828.8	145.4	4.5	22.3	-77.8	3
20	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	144.6	67.2	1.6	28633.1	0	144.6	821.2	145.4	4.5	22.3	-76.9	3
20	40	1.2	0.3	0.1	20	80	BB	BB	20	Elec	151.7	74.6	1.7	30043.7	0	151.7	864.8	132.8	4.1	20.6	-76.6	3
20	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	146.1	68	1.6	28923.1	0	146.1	835.2	144.3	4.5	22.2	-78.3	3
20	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	145.6	68.2	1.6	28820.4	0	145.6	827.6	144.3	4.5	22.2	-77.4	3
40	40	1.2	0.4	0.1	20	60	BB	BB	20	Elec	152	74.5	1.7	30088.6	0	152	839.4	138.6	4.3	21.5	-82.8	3
40	40	1.2	0.4	0.1	20	60	BB	BB	40	Elec	145.1	74.5	1.6	28729.3	0	145.1	839.4	144.2	4.5	22.1	-76.5	3
40	40	0.8	0.4	0.1	20	80	BB	BB	40	Elec	128.5	57.1	1.4	25439.9	0	128.5	754.2	223.1	7	33.3	-126.8	4
40	40	0.8	0.3	0.1	20	80	BB	BB	40	NG	128.7	57	5.2	93388.2	21.7	107.1	746.6	223.1	7	76.4	-116.6	4
40	20	0.8	0.4	0.1	20	80	BB	BB	40	Elec	129.4	58	1.4	25622	0	129.4	760.6	221.9	6.9	33.2	-127.2	4
40	20	0.8	0.3	0.1	20	80	BB	BB	40	Elec	128.6	58	1.4	25462	0	128.6	753	221.9	6.9	33.2	-125.8	4
40	40	0.8	0.4	0.1	20	80	BB	BB	20	Elec	135.3	57.1	1.5	26799.1	0	135.3	754.2	217.5	6.8	32.9	-133	4
40	40	0.8	0.3	0.1	20	80	BB	BB	20	Elec	134.5	57	1.5	26635.9	0	134.5	746.6	217.5	6.8	32.8	-131.6	4
40	20	0.8	0.4	0.1	20	80	BB	BB	20	Elec	136.3	58	1.5	26981.2	0	136.3	760.6	216.4	6.8	32.7	-133.4	4
40	20	0.8	0.3	0.1	20	80	BB	BB	40	NG	129.7	58	5.2	93573.5	21.7	108	753	221.9	6.9	76.3	-117	4
40	40	0.8	0.3	0.1	20	80	BB	BB	40	Elec	127.7	57	1.4	25276.6	0	127.7	746.6	223.1	7	33.3	-125.3	4
40	20	0.8	0.3	0.1	20	80	BB	BB	20	Elec	135.5	58	1.5	26821.3	0	135.5	753	216.4	6.8	32.7	-132	4

Office - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.4	0.2	70	60	5.175	FC	Condensing	20	Elec	96.7	24.2	5.8	105419.8	27.2	69.6	335.1	-56.3	-1.8	-6.1	167.4	1
4	20	2.5	0.3	0.2	70	60	6.9	FC	Condensing	20	NG	100.3	25.4	7.7	140914.8	38.1	62.2	355.2	-56.3	-1.8	-7.7	160.5	1
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	20	NG	95.5	26.6	7.9	144456.5	39.6	55.9	321.5	-56.3	-1.8	-7.9	170.7	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	23.8	7.3	133556.4	36.3	56.1	321.4	-54.9	-1.8	-7.1	173.2	1
4	20	2.5	0.3	0.2	70	60	6.9	FC	Condensing	20	Elec	102.4	25.4	6.1	111101.1	28.6	73.8	355.2	-56.3	-1.8	-6.3	157.8	1
4	20	2.5	0.4	0.2	70	60	6.9	FC	Condensing	20	NG	99.9	23	7.3	132903.9	35.6	64.2	367.7	-56.3	-1.8	-7.3	159.4	1
4	20	2.5	0.4	0.2	70	60	5.175	FC	Condensing	20	NG	94.8	24.2	7.5	135691.8	36.8	57.9	335.1	-56.3	-1.8	-7.4	169.9	1
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	20	Elec	97.7	26.6	6.3	115144.3	30.2	67.5	321.5	-56.3	-1.8	-6.4	167.9	1
4	20	2.5	0.4	0.2	70	60	6.9	FC	Condensing	20	Elec	101.7	23	5.6	102207.9	25.8	75.9	367.7	-56.3	-1.8	-6	157.1	1
4	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	21.5	7	126963.7	34.2	58.2	334.4	-54.9	-1.8	-6.8	171.5	1
10	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	107.4	34.5	9.4	171654.6	47.4	60	364.3	-71.5	-2.3	-12.7	165.8	2
7	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	104.5	35	9.6	174710	48.5	56	344.4	-71.5	-2.3	-13.1	171.8	2
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	105.6	38.1	10.1	184724	51.6	54	331.1	-71.5	-2.3	-14.5	172.1	2
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	110.8	37.4	10	182505.3	50.6	60.2	368.9	-71.5	-2.3	-14.2	161	2
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	104.6	37.2	10	181537.8	50.7	53.9	329.7	-71.5	-2.3	-14	173.6	2
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	106.5	37	9.9	180867.2	50.4	56.1	347.4	-71.5	-2.3	-13.9	169	2
4	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	110	34.5	9.5	173570.9	47.8	62.2	380.9	-71.5	-2.3	-12.9	160.4	2
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	107.7	40.1	10.5	191035.1	53.5	54.2	334.1	-71.5	-2.3	-15.6	169.3	2
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	109	35.4	9.7	176924.5	48.9	60.1	366	-71.5	-2.3	-13.4	163.6	2
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	Elec	114.2	37.4	8.6	157086.1	42.4	71.8	368.9	-71.5	-2.3	-11.1	156.7	2
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	Elec	110.8	32.6	7.7	139599.2	37.1	73.8	380.3	-71.5	-2.3	-9.7	159.4	3
7	20	2.5	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	106	32.5	9.1	165983.9	45.7	60.3	365	-70.1	-2.2	-11.8	166	3
10	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	107.1	31.7	9	164063	45	62.1	379	-71.5	-2.3	-11.8	164.2	3
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	107.9	32.6	9.2	166712.7	45.8	62.1	380.3	-71.5	-2.3	-12.1	163.1	3
7	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	102.4	35.1	9.5	173115	48.2	54.2	330.6	-70.1	-2.2	-12.6	174.8	3
10	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	Elec	109.9	31.7	7.5	136672.7	36.2	73.7	379	-71.5	-2.3	-9.5	160.7	3
4	20	2.5	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	103.6	34.1	9.3	170126.8	47.1	56.4	346.8	-70.1	-2.2	-12.3	171.3	3
4	20	2.5	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	107.6	31.7	9	164224.2	45	62.6	380.9	-70.1	-2.2	-11.6	162	3
10	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	103.1	34.1	9.3	170069.1	47.2	55.9	343.6	-71.5	-2.3	-12.5	173.7	3
10	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	Elec	106.1	34.1	7.9	143436.6	38.6	67.6	343.6	-71.5	-2.3	-10	169.8	3

Office - Lowest ICC - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	Elec	120	50.5	10.3	187886.4	51.7	68.3	359.7	-66.5	-2.1	-11.2	169.8	1
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	Elec	124	48.3	10	182334.7	49.7	74.3	395.5	-66.5	-2.1	-10.6	160.3	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	125.1	49.1	12.2	222695	62.4	62.7	396.3	-68.7	-2.2	-17	161.1	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	Elec	120.9	51.5	10.5	190729.4	52.6	68.3	360.5	-68.7	-2.2	-11.8	170.8	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	Elec	124.5	49.1	10.1	183756.2	50.1	74.4	396.3	-68.7	-2.2	-11.1	161.8	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	121.5	51.5	12.6	229668.2	64.8	56.7	360.5	-68.7	-2.2	-18.8	170.1	1
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	120.6	50.5	12.5	226825.2	64	56.6	359.7	-66.5	-2.1	-17.4	169.1	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	NG	118.4	51.5	12	219350.7	61.7	56.7	360.5	-65.2	-2.1	-15.4	170.4	1
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	124.6	48.3	12.2	221273.5	62	62.7	395.5	-66.5	-2.1	-16.1	159.6	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	40	NG	122.1	49.1	11.7	212377.5	59.3	62.7	396.3	-65.2	-2.1	-14.1	161.4	1
4	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	124.2	46.1	11.7	212633.5	59.3	65	415	-68.7	-2.2	-14.9	159.9	2
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	120.4	48.2	12	219189.8	61.6	58.8	378.8	-68.7	-2.2	-16.2	169.2	2
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	122.7	46.8	11.8	215300.4	60.2	62.5	391.6	-68.7	-2.2	-15.4	164.7	2
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	118.9	49.1	12.2	221946.3	62.5	56.4	355.8	-68.7	-2.2	-16.8	173.9	2
10	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	116.6	44.7	11.4	207316	58.1	58.5	372.1	-68.7	-2.2	-14.1	174.7	2
10	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	120.7	42.7	11.1	201622.8	56	64.7	408.2	-68.7	-2.2	-13.2	165.1	2
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	117.4	48	11.9	217126.6	61.1	56.3	353.7	-68.7	-2.2	-15.8	176	2
10	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	121.6	45.7	11.6	211859.7	59.2	62.4	389.5	-68.7	-2.2	-14.8	166.4	2
7	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	117.3	45.8	11.5	209563.3	58.7	58.6	374.1	-68.7	-2.2	-14.4	173.5	2
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	121.6	43.8	11.2	204456.4	56.8	64.8	410.3	-68.7	-2.2	-13.6	163.7	2
10	20	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	112.7	36.3	9.8	179098	49.4	63.3	387.5	-62.2	-2	-9.7	171	3
7	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	109.2	36.6	9.8	178907.1	49.6	59.6	372.5	-62.2	-2	-9.6	177.3	3
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	113.4	34.7	9.5	173195.3	47.5	65.9	407.7	-62.2	-2	-9.2	167.6	3
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	112.8	34.7	7.4	134256.5	35.2	77.5	407.7	-62.2	-2	-7	168.3	3
7	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	108.6	36.6	7.7	139968.3	37.3	71.2	372.5	-62.2	-2	-7.2	177.9	3
10	20	2	0.3	0.1	70	0	6.9	FC	Condensing	20	Elec	112	36.3	7.7	140159.2	37.2	74.9	387.5	-62.2	-2	-7.2	171.7	3
10	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	111.5	33.6	7.1	129998.2	34	77.5	405.5	-62.2	-2	-6.8	170.2	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	107.3	35.5	7.5	135912.6	36.1	71.2	370.4	-62.2	-2	-7.1	179.8	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	107.9	35.5	9.6	174851.4	48.4	59.6	370.4	-62.2	-2	-9.3	179.1	3
10	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	112.1	33.6	9.3	168937	46.2	65.8	405.5	-62.2	-2	-8.9	169.5	3

Office - Lowest ICC - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	143.8	71.9	16.4	298724	85.2	58.6	493.8	-69.9	-2.2	-45.8	164.6	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	140.8	74.8	16.9	307325.8	88.1	52.7	465.9	-69.9	-2.2	-66.2	171.9	1
4	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	140.6	67.8	15.5	282530.5	80.3	60.3	493.7	-69.9	-2.2	-28.9	168.7	1
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	137.2	70.5	15.9	290361.4	83	54.2	465.7	-69.9	-2.2	-35.2	176.4	1
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	140.4	68.4	15.8	287656.7	81.9	58.4	493.4	-69.9	-2.2	-32.7	169	1
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	137	71.4	16.2	295281.3	84.5	52.5	465.4	-69.9	-2.2	-40.7	176.6	1
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	137.6	64.4	15	273180.3	77.5	60.1	493.2	-69.9	-2.2	-23.8	172.3	1
7	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	134.4	67.1	15.5	281405.8	80.3	54.1	465.3	-69.9	-2.2	-28.2	179.9	1
10	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	138.3	66.8	15.4	280852.8	79.9	58.4	493.1	-69.9	-2.2	-27.9	171.6	1
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	135.3	69.8	15.9	289549.7	82.8	52.4	465.1	-69.9	-2.2	-34.4	178.9	1
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	119.1	52.2	10.4	189892.1	52.4	66.7	463.5	-61.9	-2	-8.3	191	2
10	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	122.9	49.8	10.1	183188	50.1	72.8	491.7	-61.9	-2	-7.9	182.8	2
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	124.3	51.3	10.3	187970.9	51.5	72.8	491.9	-61.9	-2	-8.1	181	2
10	40	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	122.2	48.5	12	217877.3	61	61.2	491.6	-59.3	-1.9	-9.9	181	2
10	40	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	123.7	52	12.6	229562.2	64.6	59	491.4	-59.3	-1.9	-11.1	179.2	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	119.7	52.2	12.6	228830.9	64.7	55	463.5	-61.9	-2	-11.5	190.3	2
10	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	123.5	49.8	12.2	222126.9	62.3	61.2	491.7	-61.9	-2	-10.8	182.1	2
7	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	120.2	52.5	12.7	230585.4	65.2	55	463.6	-59.3	-1.9	-11.2	187	2
7	40	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	123.7	50.1	12.2	222913	62.5	61.2	491.8	-59.3	-1.9	-10.4	179.1	2
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	124.9	51.3	12.5	226909.7	63.7	61.2	491.9	-61.9	-2	-11.3	180.3	2
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	114.2	39.9	10.3	187607.8	52	62.2	490.8	-41.4	-1.3	-5.4	173.1	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	110.1	42	10.6	193790.3	54.2	55.9	462.5	-41.4	-1.3	-5.7	181.7	3
40	20	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	114.3	40	10.3	187696.3	52	62.3	490.8	-32.9	-1.1	-4.3	164.5	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	40	NG	111.2	39.9	9.7	177290.3	48.9	62.2	490.8	-37.1	-1.2	-4.5	172.6	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	107	42	10.1	183472.8	51.1	55.9	462.5	-37.1	-1.2	-4.7	181.2	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	113.6	39.9	8.2	148669	39.7	73.9	490.8	-41.4	-1.3	-4.2	173.7	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	109.5	42	8.5	154851.5	42	67.5	462.5	-41.4	-1.3	-4.4	182.4	3
40	20	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	113.7	40	8.2	148757.5	39.8	73.9	490.8	-32.9	-1.1	-3.4	165.2	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	40	Elec	110.7	39.9	8.1	148086.2	39.7	71	490.8	-37.1	-1.2	-3.8	173.1	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	106.6	42	8.5	154268.7	42	64.6	462.5	-37.1	-1.2	-3.9	181.7	3

Office - Lowest ICC - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	153.3	90.6	19.1	347677.3	100	53.2	516	-51.6	-1.7	139	146.8	1
10	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	155.7	87.7	18.5	337330.7	96.6	59	544.2	-51.6	-1.7	-261.6	140.3	1
7	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	152	88.1	18.5	337647.9	97	55.1	516.1	-51.6	-1.7	-287	148.3	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	162.6	93.9	19.8	359739	103.3	59.3	544.9	-51.6	-1.7	49.9	131.6	1
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	157.2	89.7	18.8	342192.2	98.1	59.1	544.4	-51.6	-1.7	738	138.4	1
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	156.9	92.4	19.4	353455.7	101.6	55.3	516.6	-51.6	-1.7	74.9	142.2	1
4	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	159.5	89.6	18.9	343626.8	98.4	61.1	544.9	-51.6	-1.7	346.9	135.5	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	159.7	96.9	20.2	368203.8	106.1	53.5	516.8	-51.6	-1.7	34.4	138.8	1
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	155.7	85.4	18.2	331500	94.8	61	544.4	-51.6	-1.7	-99.7	140.1	1
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	155.1	92.6	19.4	353390.9	101.7	53.3	516.2	-51.6	-1.7	75.3	144.5	1
10	20	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	123.1	52.7	10.6	193011.7	53.1	69.9	541	-11.8	-0.4	-1.5	141	2
10	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	126.7	50.7	10.2	185409.4	50.5	76.2	570.5	-11.8	-0.4	-1.4	132.8	2
7	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	129.1	52.5	10.7	193947.9	53.1	76.1	570	-11.8	-0.4	-1.5	129.9	2
10	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	122.5	50.7	11.4	208228.8	58	64.5	570.5	-11.8	-0.4	-1.6	138.1	2
10	40	1.2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	117.4	54.3	12.1	220123.3	62.1	55.3	512.4	-9.1	-0.3	-1.4	149.1	2
10	40	1.2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	120.8	52.1	11.7	212140.1	59.3	61.4	537.5	-9.1	-0.3	-1.3	141.7	2
10	20	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.7	52.7	11.8	214992.3	60.4	58.3	541	-11.8	-0.4	-1.7	146.6	2
7	40	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.8	53	11.8	215671.2	60.6	58.2	540.2	-9.1	-0.3	-1.3	143.8	2
7	40	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	122.9	51	11.5	210010.2	58.5	64.4	570.8	-9.1	-0.3	-1.3	134.8	2
7	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	124.7	52.5	11.9	215955.9	60.3	64.4	570	-11.8	-0.4	-1.7	135.4	2
40	40	1.6	0.3	0.1	70	80	6.9	FC	Condensing	20	NG	102.9	33.3	8	146539.7	39.7	63.1	578.3	22.6	0.7	2.1	127.1	3
40	40	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	NG	102.8	30.8	7.6	137760.2	37	65.8	582.4	22.6	0.7	2	126.6	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	97.4	31.8	7.7	139390.1	37.8	59.5	547.6	22.6	0.7	2	137.7	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	40	NG	101.6	32.3	7.3	133495.1	35.7	65.8	582.5	24.1	0.8	2.1	126.5	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	99.4	31.8	6	109471.5	28.3	71.2	547.6	22.6	0.7	1.8	135	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	Elec	106.8	32.3	6.3	114224.8	29.3	77.5	582.5	19.9	0.6	1.6	124.3	3
40	40	1.6	0.3	0.1	70	80	6.9	FC	Condensing	20	Elec	105.1	33.3	6.4	117294.8	30.4	74.7	578.3	22.6	0.7	1.8	124.2	3
40	40	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	Elec	104.8	30.8	5.9	107539.2	27.3	77.5	582.4	22.6	0.7	1.8	124.1	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	NG	104.6	32.3	7.9	143812.6	38.8	65.8	582.5	19.9	0.6	1.8	127	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	40	Elec	103.9	32.3	6.2	113642	29.3	74.6	582.5	24.1	0.8	1.9	123.6	3

Office - Highest NPV - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	20	NG	95.5	26.6	7.9	144456.5	39.6	55.9	321.5	-56.3	-1.8	-7.9	170.7	1
4	40	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	88.7	23.1	6.7	121356.1	32.7	56.1	321	-48.9	-1.6	-5.8	171.7	1
4	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	89.4	21.5	6.4	116646.2	31.2	58.2	334.4	-51.2	-1.6	-5.9	171.5	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	89.3	23.8	6.8	123238.9	33.3	56.1	321.4	-51.2	-1.6	-6.2	173.2	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	94.3	23.8	5.7	103100.1	26.6	67.7	321.4	-54.9	-1.8	-5.8	170.7	1
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	40	NG	92.4	26.6	7.4	134139	36.5	55.9	321.5	-52.6	-1.7	-6.8	170.8	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	23.8	7.3	133556.4	36.3	56.1	321.4	-54.9	-1.8	-7.1	173.2	1
4	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	21.5	7	126963.7	34.2	58.2	334.4	-54.9	-1.8	-6.8	171.5	1
4	40	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	91.8	23.1	7.2	131673.6	35.8	56.1	321	-52.6	-1.7	-6.7	171.6	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	91.4	23.8	5.6	102517.3	26.6	64.8	321.4	-51.2	-1.6	-5.4	170.6	1
7	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	87.3	21.9	6.4	116717	31.3	56	318.7	-51.2	-1.6	-5.9	176	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	85.6	16.1	6	108447.9	28.8	56.8	318.5	-49.4	-1.6	-5.4	176.3	2
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	81.4	15.4	5.2	94124.7	24.6	56.8	318.4	-43.4	-1.4	-4.4	175.6	2
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	84.4	15.4	5.7	104442.2	27.6	56.8	318.4	-47.1	-1.5	-5	175.5	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	82.6	16.1	5.4	98130.4	25.8	56.8	318.5	-45.7	-1.5	-4.7	176.4	2
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	89.8	21	6.9	125096.9	33.8	56	317.3	-54.9	-1.8	-6.7	176.9	2
7	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	90.4	21.9	7	127034.5	34.4	56	318.7	-54.9	-1.8	-6.8	176	2
10	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	89.2	18.8	6.4	116443.7	31.1	58.1	330.5	-54.9	-1.8	-6.3	175.9	2
10	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	86.2	18.8	5.8	106126.2	28	58.1	330.5	-51.2	-1.6	-5.5	176	2
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	86.7	21	6.3	114779.4	30.7	56	317.3	-51.2	-1.6	-5.9	177	2
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	93	27.9	7.6	139153.2	38	54.9	329.5	-58.5	-1.9	-7.9	175	3
10	20	2	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	93.7	28.6	7.8	141658.1	38.8	54.9	330.3	-60.8	-1.9	-8.4	176.3	3
10	20	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	96.8	28.6	8.3	151975.6	41.8	54.9	330.3	-64.5	-2.1	-9.6	176.2	3
10	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	98.6	34.2	8.8	160457.5	44.4	54.2	329.3	-66.4	-2.1	-10.6	176	3
7	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	99.4	35.1	8.9	162797.5	45.1	54.2	330.6	-66.4	-2.1	-10.8	174.9	3
10	20	2.5	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	100.7	31.2	8.8	160742.1	44.4	56.3	343.2	-70.1	-2.2	-11.2	175.3	3
7	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	102.4	35.1	9.5	173115	48.2	54.2	330.6	-70.1	-2.2	-12.6	174.8	3
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	96	27.9	8.2	149470.7	41.1	54.9	329.5	-62.2	-2	-9.1	174.9	3
10	20	2.5	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	97.6	31.2	8.3	150424.6	41.3	56.3	343.2	-66.4	-2.1	-9.8	175.4	3
10	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	101.7	34.2	9.4	170775	47.5	54.2	329.3	-70.1	-2.2	-12.3	175.9	3

Office - Highest NPV - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	91.7	24.2	6.8	124404.8	33.5	58.3	340.6	-44.2	-1.4	-4.7	184.9	1
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	95.7	28.9	7.7	140282.2	38.2	57.5	341	-49.5	-1.6	-5.8	185.2	1
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	98.2	28.9	6.1	111660.9	29	69.1	341	-53	-1.7	-5.2	185.6	1
7	40	2	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	93.3	23.3	5.1	92874.3	23.4	69.8	340.5	-45.5	-1.5	-4.1	184.2	1
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	95.3	28.9	6.1	111078.1	29	66.2	341	-49.5	-1.6	-4.9	185.7	1
7	40	2	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	90.4	23.3	5.1	92291.5	23.4	66.9	340.5	-42	-1.3	-3.7	184.3	1
7	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	91.3	24.2	5.2	95200.6	24.3	67	340.6	-44.2	-1.4	-4	185.4	1
7	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	94.8	24.2	7.4	134722.3	36.5	58.3	340.6	-47.8	-1.5	-5.4	184.6	1
10	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	98.8	28.9	8.3	150599.7	41.3	57.5	341	-53	-1.7	-6.6	184.9	1
7	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	94.2	24.2	5.3	95783.4	24.3	69.9	340.6	-47.8	-1.5	-4.3	185.3	1
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	92.5	22.3	7	127552.3	34.4	58.1	340.4	-45.5	-1.5	-4.9	185.2	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	90.1	23.2	5	91629.2	23.2	66.9	340.5	-44.2	-1.4	-3.9	186.8	2
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	40	Elec	90.3	20.8	4.6	84083.5	20.8	69.4	354.6	-44.2	-1.4	-3.8	184.9	2
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	91.9	22.3	4.9	88613.5	22.2	69.8	340.4	-45.5	-1.5	-4	185.9	2
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	Elec	93.2	20.8	4.6	84666.3	20.8	72.4	354.6	-47.8	-1.5	-4.1	184.8	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	93	23.2	5.1	92212	23.2	69.8	340.5	-47.8	-1.5	-4.3	186.7	2
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	89	22.3	4.8	88030.7	22.2	66.9	340.4	-42	-1.3	-3.7	186	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	93.7	23.2	7.2	131150.8	35.5	58.2	340.5	-47.8	-1.5	-5.3	186.1	2
10	40	2	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	89.5	22.3	6.4	117234.8	31.3	58.1	340.4	-42	-1.3	-4.3	185.5	2
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	NG	90.6	23.2	6.6	120833.3	32.4	58.2	340.5	-44.2	-1.4	-4.6	186.3	2
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	20	Elec	107	37.4	7.8	142876	38.3	68.6	351.5	-59.9	-1.9	-7.1	180.3	3
20	20	2	0.3	0.1	70	0	5.175	FC	Condensing	20	Elec	106	36.9	7.7	139723.1	37.4	68.6	349.5	-57.7	-1.8	-6.7	179.6	3
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	107.6	37.4	10	181814.8	50.6	57	351.5	-59.9	-1.9	-9.5	179.6	3
20	20	2	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	103.5	36.9	9.2	168344.4	46.6	56.9	349.5	-54.2	-1.7	-7.7	179.2	3
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	40	NG	104.5	37.4	9.4	171497.3	47.5	57	351.5	-56.4	-1.8	-8.2	179.9	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	104.9	35.5	9	164533.9	45.3	59.6	370.4	-58.6	-1.9	-8.1	179.3	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	104.4	35.5	7.4	135329.8	36.1	68.3	370.4	-58.6	-1.9	-6.6	179.8	3
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	40	Elec	104.1	37.4	7.8	142293.2	38.3	65.7	351.5	-56.4	-1.8	-6.7	180.4	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	107.3	35.5	7.5	135912.6	36.1	71.2	370.4	-62.2	-2	-7.1	179.8	3
20	20	2	0.3	0.1	70	0	5.175	FC	Condensing	40	Elec	103.1	36.9	7.6	139140.3	37.4	65.7	349.5	-54.2	-1.7	-6.3	179.7	3

Office - Highest NPV - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	101.6	36	9.4	170466.9	47.4	54.2	458.4	-44.5	-1.4	-5.2	195.9	1
10	40	2	0.4	0.1	70	60	5.175	FC	Condensing	40	Elec	96	31.5	6.4	117114.8	30.9	65.1	458.6	-37.6	-1.2	-3.3	195.8	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	40	Elec	97.1	32.8	6.6	120902.3	32	65.1	458.7	-40.2	-1.3	-3.6	197	1
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	40	Elec	98.1	36	7.2	130945.3	35.1	63	458.4	-40.2	-1.3	-3.7	195.9	1
10	40	2	0.4	0.1	70	60	5.175	FC	Condensing	20	Elec	98.9	31.5	6.5	117697.6	30.9	68	458.6	-41.8	-1.3	-3.6	196.4	1
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	Elec	101	36	7.2	131528.1	35.1	65.9	458.4	-44.5	-1.4	-4.2	196.6	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	97.6	32.8	8.2	150106.4	41.2	56.4	458.7	-40.2	-1.3	-4.2	196.5	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	Elec	100	32.8	6.7	121485.1	32	68	458.7	-44.5	-1.4	-4	197.7	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	100.6	32.8	8.8	160423.9	44.3	56.4	458.7	-44.5	-1.4	-4.9	197	1
10	40	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	99.5	31.5	8.6	156636.4	43.1	56.4	458.6	-41.8	-1.3	-4.5	195.8	1
20	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	117	50.2	10.1	183025.5	50.4	66.6	463.3	-56.8	-1.8	-7.2	188.5	2
10	40	2	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	115.4	50.9	11.8	214538.6	60.4	55	463.4	-55	-1.8	-8.9	188.7	2
20	20	2	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	114.1	50.2	10	182442.7	50.4	63.7	463.3	-52.5	-1.7	-6.6	187.8	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	119.7	52.2	12.6	228830.9	64.7	55	463.5	-61.9	-2	-11.5	190.3	2
10	40	2	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	115	50.9	10.2	185334.5	51.2	63.7	463.4	-55	-1.8	-7.1	189.2	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	119.1	52.2	10.4	189892.1	52.4	66.7	463.5	-61.9	-2	-8.3	191	2
10	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	117.9	50.9	10.2	185917.3	51.2	66.6	463.4	-59.3	-1.9	-7.7	189.8	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	116.2	52.2	10.4	189309.3	52.4	63.7	463.5	-57.7	-1.8	-7.7	190.4	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	116.6	52.2	12	218513.4	61.6	55	463.5	-57.7	-1.8	-9.7	189.9	2
10	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.5	50.9	12.3	224856.2	63.5	55	463.4	-59.3	-1.9	-10.6	189.2	2
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	109.5	42	8.5	154851.5	42	67.5	462.5	-41.4	-1.3	-4.4	182.4	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	110.1	42	10.6	193790.3	54.2	55.9	462.5	-41.4	-1.3	-5.7	181.7	3
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	95.4	27.1	5.6	102023.7	26.2	69.2	457.9	-22	-0.7	-1.8	181	3
20	20	2	0.3	0.1	70	80	5.175	FC	Condensing	20	Elec	96.2	29.9	6.1	111345	29.1	67.2	457.6	-22	-0.7	-1.9	180	3
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	40	Elec	92.5	27.1	5.6	101440.9	26.2	66.3	457.9	-17.7	-0.6	-1.4	180.3	3
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	96	27.1	7.7	140962.5	38.4	57.6	457.9	-22	-0.7	-2.2	180.3	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	107	42	10.1	183472.8	51.1	55.9	462.5	-37.1	-1.2	-4.7	181.2	3
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	40	NG	93	27.1	7.2	130645	35.4	57.6	457.9	-17.7	-0.6	-1.6	179.8	3
20	40	2	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	94.4	25.9	5.4	98702.6	25.2	69.2	457.8	-19.3	-0.6	-1.5	179.5	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	40	Elec	106.6	42	8.5	154268.7	42	64.6	462.5	-37.1	-1.2	-3.9	181.7	3

Office - Highest NPV - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	111.5	47.7	10.7	195523.4	54.7	56.9	508.6	-23.5	-0.8	-2.9	171.2	1
7	20	2	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	112.3	51.2	10.9	198054	55.4	56.9	508.9	-21.9	-0.7	-2.8	168.6	1
20	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	110.4	46.8	10.5	191807.6	53.6	56.9	525.4	-21.4	-0.7	-2.6	168.4	1
10	20	2	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	114.8	52.8	11.7	213339.1	60.1	54.7	523.6	-26.2	-0.8	-3.7	168	1
10	40	2	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	108.4	47.7	10.2	185205.8	51.6	56.9	508.6	-19.3	-0.6	-2.3	170.7	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	110.3	49.3	10.5	191374.8	53.4	56.9	508.7	-21.9	-0.7	-2.7	171.1	1
7	40	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	113.4	49.6	11.1	201824.8	56.5	56.9	508.8	-23.5	-0.8	-3.1	168.9	1
7	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	115.4	51.2	11.4	208371.5	58.5	56.9	508.9	-26.2	-0.8	-3.6	169.1	1
10	20	2	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	113.4	49.3	11.1	201692.3	56.5	56.9	508.7	-26.2	-0.8	-3.4	171.6	1
7	40	2	0.4	0.1	70	60	5.175	FC	Condensing	40	NG	110.3	49.6	10.5	191507.3	53.5	56.9	508.8	-19.3	-0.6	-2.3	168.4	1
20	40	2	0.3	0.1	70	80	5.175	FC	Condensing	40	NG	103.5	43.7	9.4	170935.8	47.4	56.1	536.5	3	0.1	0.3	151.2	2
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	40	NG	103.8	42.2	9	164737.5	45.4	58.4	540.7	0.3	0	0	152.9	2
20	20	2	0.3	0.1	70	80	5.175	FC	Condensing	40	NG	105.1	45.2	9.7	176257.1	49	56.1	536.3	0.3	0	0	151.9	2
20	40	2	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	105.2	40.7	9.3	169622	46.9	58.4	540.8	-1.3	0	-0.1	152.7	2
20	40	2	0.4	0.1	70	80	5.175	FC	Condensing	40	NG	102.2	40.7	8.7	159304.5	43.8	58.4	540.8	3	0.1	0.3	152.2	2
20	40	2	0.3	0.1	70	80	5.175	FC	Condensing	20	NG	106.5	43.7	10	181253.3	50.5	56.1	536.5	-1.3	0	-0.2	151.7	2
20	20	2	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	106.9	42.2	9.6	175055	48.5	58.4	540.7	-4	-0.1	-0.4	153.4	2
20	20	2	0.3	0.1	70	80	5.175	FC	Condensing	20	NG	108.1	45.2	10.2	186574.6	52.1	56.1	536.3	-4	-0.1	-0.5	152.4	2
10	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	101	35.3	8.3	151894.2	41.6	59.5	544.3	6.6	0.2	0.6	149.5	2
10	40	1.6	0.3	0.1	70	80	5.175	FC	Condensing	20	NG	101.4	37.9	8.9	161190.1	44.5	56.9	540.2	6.6	0.2	0.7	149.6	2
20	40	1.2	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	93.8	25.3	4.7	85970.8	21.2	72.6	549.3	30.5	1	2.2	133.8	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	99.4	31.8	6	109471.5	28.3	71.2	547.6	22.6	0.7	1.8	135	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	40	NG	94.3	31.8	7.1	129072.6	34.8	59.5	547.6	26.8	0.9	2.3	137.2	3
40	20	1.2	0.3	0.1	70	80	5.175	FC	Condensing	40	NG	88.8	27.8	6.3	115276.9	30.8	58	544.5	43.2	1.4	3.5	128	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	97.4	31.8	7.7	139390.1	37.8	59.5	547.6	22.6	0.7	2	137.7	3
20	40	1.2	0.4	0.1	70	80	5.175	FC	Condensing	40	Elec	90.9	25.3	4.7	85388	21.2	69.7	549.3	34.8	1.1	2.5	133.2	3
40	20	1.2	0.3	0.1	70	80	5.175	FC	Condensing	20	NG	91.8	27.8	6.9	125594.4	33.8	58	544.5	39	1.2	3.3	128.5	3
20	40	1.2	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	92.4	25.3	6.5	118143	31.4	61	549.3	30.5	1	2.5	135.6	3
20	40	1.2	0.4	0.1	70	80	5.175	FC	Condensing	40	NG	89.4	25.3	5.9	107825.5	28.4	61	549.3	34.8	1.1	2.7	135.1	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	40	Elec	96.5	31.8	6	108888.7	28.3	68.3	547.6	26.8	0.9	2.1	134.4	3

Office - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	40	2.5	0.3	0.2	70	60	5.175	FC	Condensing	20	NG	94.7	25.9	7.8	142049.3	38.8	55.9	320.8	-54	-1.7	-7.4	169.4	1
4	40	2.5	0.4	0.2	70	60	5.175	FC	Condensing	20	NG	94.5	23.5	7.4	134707.6	36.5	57.9	334.5	-54	-1.7	-7	168	1
4	40	2.5	0.3	0.2	70	60	6.9	FC	Condensing	20	NG	99.8	24.7	7.6	139175.2	37.6	62.1	355	-54	-1.7	-7.3	158.9	1
4	20	2.5	0.4	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	21.5	7	126963.7	34.2	58.2	334.4	-54.9	-1.8	-6.8	171.5	1
4	20	2.5	0.4	0.2	70	60	5.175	FC	Condensing	20	NG	94.8	24.2	7.5	135691.8	36.8	57.9	335.1	-56.3	-1.8	-7.4	169.9	1
4	20	2.5	0.4	0.2	70	60	6.9	FC	Condensing	20	NG	99.9	23	7.3	132903.9	35.6	64.2	367.7	-56.3	-1.8	-7.3	159.4	1
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	40	NG	92.4	26.6	7.4	134139	36.5	55.9	321.5	-52.6	-1.7	-6.8	170.8	1
4	20	2.5	0.3	0.1	70	60	5.175	FC	Condensing	20	NG	92.4	23.8	7.3	133556.4	36.3	56.1	321.4	-54.9	-1.8	-7.1	173.2	1
4	20	2.5	0.3	0.2	70	60	5.175	FC	Condensing	20	NG	95.5	26.6	7.9	144456.5	39.6	55.9	321.5	-56.3	-1.8	-7.9	170.7	1
4	20	2.5	0.3	0.2	70	60	6.9	FC	Condensing	20	NG	100.3	25.4	7.7	140914.8	38.1	62.2	355.2	-56.3	-1.8	-7.7	160.5	1
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	104.6	37.2	10	181537.8	50.7	53.9	329.7	-71.5	-2.3	-14	173.6	2
7	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	105	37.4	10	182694.2	51	54	330.3	-69.1	-2.2	-13.8	170.7	2
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	106.5	37	9.9	180867.2	50.4	56.1	347.4	-71.5	-2.3	-13.9	169	2
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	109	35.4	9.7	176924.5	48.9	60.1	366	-71.5	-2.3	-13.4	163.6	2
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	107.7	40.1	10.5	191035.1	53.5	54.2	334.1	-71.5	-2.3	-15.6	169.3	2
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	105.6	38.1	10.1	184724	51.6	54	331.1	-71.5	-2.3	-14.5	172.1	2
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	107.3	39.4	10.4	189887.1	53.1	54.1	333.3	-69.1	-2.2	-14.9	167.5	2
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	110.3	36.7	9.9	180935.8	50.1	60.1	368.2	-69.1	-2.2	-13.5	159.4	2
4	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	104.5	37.1	9.9	179828.9	50.2	54.4	333.3	-70.1	-2.2	-13.5	171.9	2
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	110.8	37.4	10	182505.3	50.6	60.2	368.9	-71.5	-2.3	-14.2	161	2
10	40	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	102.5	33.4	9.2	168010.9	46.5	55.9	342.9	-69.1	-2.2	-11.9	172.2	3
7	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	102.4	35.1	9.5	173115	48.2	54.2	330.6	-70.1	-2.2	-12.6	174.8	3
7	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	107.9	32.6	9.2	166712.7	45.8	62.1	380.3	-71.5	-2.3	-12.1	163.1	3
4	20	2.5	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	103.6	34.1	9.3	170126.8	47.1	56.4	346.8	-70.1	-2.2	-12.3	171.3	3
7	40	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	101.8	34.4	9.4	171148	47.6	54.2	329.8	-67.7	-2.2	-12	173.3	3
7	40	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	103.5	34.3	9.4	171400.2	47.6	56	343.7	-69.1	-2.2	-12.2	170.8	3
10	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	101.7	34.2	9.4	170775	47.5	54.2	329.3	-70.1	-2.2	-12.3	175.9	3
10	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	107.1	31.7	9	164063	45	62.1	379	-71.5	-2.3	-11.8	164.2	3
10	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	103.1	34.1	9.3	170069.1	47.2	55.9	343.6	-71.5	-2.3	-12.5	173.7	3
4	40	2.5	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	107.4	33.8	9.4	170286.9	47	60.4	367.6	-67.7	-2.2	-11.9	161.7	3

Office - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	Elec	120.9	51.5	10.5	190729.4	52.6	68.3	360.5	-68.7	-2.2	-11.8	170.8	1
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	NG	117.5	50.5	11.9	216507.7	60.9	56.6	359.7	-63	-2	-14.4	169.4	1
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	40	NG	121.6	48.3	11.6	210956	58.9	62.7	395.5	-63	-2	-13.4	159.9	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	NG	118.4	51.5	12	219350.7	61.7	56.7	360.5	-65.2	-2.1	-15.4	170.4	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	40	NG	122.1	49.1	11.7	212377.5	59.3	62.7	396.3	-65.2	-2.1	-14.1	161.4	1
4	20	2.5	0.3	0.2	50	0	5.175	FC	Condensing	20	NG	118.4	49.6	12.3	223422	63	55.3	346.4	-52.2	-1.7	-13	159.3	1
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	125.1	49.1	12.2	222695	62.4	62.7	396.3	-68.7	-2.2	-17	161.1	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	121.5	51.5	12.6	229668.2	64.8	56.7	360.5	-68.7	-2.2	-18.8	170.1	1
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	124.6	48.3	12.2	221273.5	62	62.7	395.5	-66.5	-2.1	-16.1	159.6	1
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	120.6	50.5	12.5	226825.2	64	56.6	359.7	-66.5	-2.1	-17.4	169.1	1
7	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	117.8	48.2	12	218167.6	61.4	56.3	355.1	-66.5	-2.1	-15.5	173.2	2
4	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	118	47.9	11.9	217367.5	61.1	56.8	359	-67.4	-2.2	-15.5	173.4	2
4	20	2.5	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	124.2	46.1	11.7	212633.5	59.3	65	415	-68.7	-2.2	-14.9	159.9	2
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	120.4	48.2	12	219189.8	61.6	58.8	378.8	-68.7	-2.2	-16.2	169.2	2
4	40	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	119.4	47.3	11.9	215824.4	60.6	58.8	378.1	-66.5	-2.1	-15	168.3	2
7	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	122.7	46.8	11.8	215300.4	60.2	62.5	391.6	-68.7	-2.2	-15.4	164.7	2
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	118.9	49.1	12.2	221946.3	62.5	56.4	355.8	-68.7	-2.2	-16.8	173.9	2
10	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	116.4	47.1	11.8	214062.8	60.2	56.2	353	-66.5	-2.1	-14.7	175.1	2
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	117.4	48	11.9	217126.6	61.1	56.3	353.7	-68.7	-2.2	-15.8	176	2
10	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	121.6	45.7	11.6	211859.7	59.2	62.4	389.5	-68.7	-2.2	-14.8	166.4	2
7	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	109.2	36.6	9.8	178907.1	49.6	59.6	372.5	-62.2	-2	-9.6	177.3	3
10	40	2	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	114.2	36	9.8	177591.1	48.8	65.4	406.4	-61.2	-2	-9.4	165.8	3
4	40	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	114.7	36.1	9.7	177395.2	48.7	66	411.4	-59.9	-1.9	-9.2	163.3	3
10	40	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	107.6	37.4	10	181814.8	50.6	57	351.5	-59.9	-1.9	-9.5	179.6	3
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	107.9	35.5	9.6	174851.4	48.4	59.6	370.4	-62.2	-2	-9.3	179.1	3
10	20	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	112.7	36.3	9.8	179098	49.4	63.3	387.5	-62.2	-2	-9.7	171	3
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	113.4	34.7	9.5	173195.3	47.5	65.9	407.7	-62.2	-2	-9.2	167.6	3
7	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	108.2	35.7	9.6	175570.8	48.6	59.6	371.7	-59.9	-1.9	-9	176.4	3
7	40	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	112.6	36.5	9.8	178850	49.3	63.3	388.9	-59.9	-1.9	-9.3	168.7	3
20	20	2	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	109.5	37.4	10	181590.8	50.4	59.1	369.1	-59	-1.9	-9.4	174.2	3

Office - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	143.8	71.9	16.4	298724	85.2	58.6	493.8	-69.9	-2.2	-45.8	164.6	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	140.8	74.8	16.9	307325.8	88.1	52.7	465.9	-69.9	-2.2	-66.2	171.9	1
4	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	136	69.9	16	291008.5	83.2	52.8	465.2	-68.3	-2.2	-35	176.3	1
4	20	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	NG	137.2	70.5	15.9	290361.4	83	54.2	465.7	-69.9	-2.2	-35.2	176.4	1
4	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	NG	137.7	74.8	16.3	297008.3	85	52.7	465.9	-65.6	-2.1	-40.5	171.4	1
4	40	2.5	0.3	0.2	70	0	6.9	FC	Condensing	20	NG	142.2	70.6	16.1	293295.9	83.6	58.6	493.7	-67.2	-2.2	-36.8	164	1
4	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	139.3	73.5	16.6	302394.8	86.6	52.7	465.7	-67.2	-2.2	-50.7	171.1	1
7	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	137	71.4	16.2	295281.3	84.5	52.5	465.4	-69.9	-2.2	-40.7	176.6	1
7	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	136	70.1	16	291962.3	83.6	52.5	465.3	-67.2	-2.2	-35.4	175.2	1
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	NG	135.3	69.8	15.9	289549.7	82.8	52.4	465.1	-69.9	-2.2	-34.4	178.9	1
20	40	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	118.2	52.6	12.7	230645.8	65.3	52.9	463	-54.1	-1.7	-10.3	184.4	2
20	20	2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	119.3	53.9	12.9	234148.7	66.4	52.9	463.1	-56.8	-1.8	-11.2	185.8	2
20	20	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	123.1	51.2	12.5	227633.9	64.1	59	491.3	-56.8	-1.8	-10.5	177.5	2
10	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.5	50.9	12.3	224856.2	63.5	55	463.4	-59.3	-1.9	-10.6	189.2	2
10	40	2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	123.7	52	12.6	229562.2	64.6	59	491.4	-59.3	-1.9	-11.1	179.2	2
10	20	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	119.7	52.2	12.6	228830.9	64.7	55	463.5	-61.9	-2	-11.5	190.3	2
10	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	123.5	49.8	12.2	222126.9	62.3	61.2	491.7	-61.9	-2	-10.8	182.1	2
7	40	2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	120.2	52.5	12.7	230585.4	65.2	55	463.6	-59.3	-1.9	-11.2	187	2
7	40	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	123.7	50.1	12.2	222913	62.5	61.2	491.8	-59.3	-1.9	-10.4	179.1	2
7	20	2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	124.9	51.3	12.5	226909.7	63.7	61.2	491.9	-61.9	-2	-11.3	180.3	2
10	20	1.2	0.4	0.2	70	0	6.9	FC	Condensing	20	NG	115.2	40.2	10.4	188470.5	52.2	63	489.5	-31.7	-1	-4.2	162.3	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	113.6	39.9	8.2	148669	39.7	73.9	490.8	-41.4	-1.3	-4.2	173.7	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	114.2	39.9	10.3	187607.8	52	62.2	490.8	-41.4	-1.3	-5.4	173.1	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	110.1	42	10.6	193790.3	54.2	55.9	462.5	-41.4	-1.3	-5.7	181.7	3
40	20	1.6	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	114.3	40	10.3	187696.3	52	62.3	490.8	-32.9	-1.1	-4.3	164.5	3
4	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	116.2	40.8	10.5	190539.7	52.8	63.4	491.3	-30.1	-1	-4	159.3	3
20	40	1.6	0.4	0.1	70	0	6.9	FC	Condensing	40	NG	111.2	39.9	9.7	177290.3	48.9	62.2	490.8	-37.1	-1.2	-4.5	172.6	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	40	NG	107	42	10.1	183472.8	51.1	55.9	462.5	-37.1	-1.2	-4.7	181.2	3
10	20	1.2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	107.9	41.2	10.5	190838.8	53.4	54.5	461.9	-30.1	-1	-4	173.2	3
20	40	1.6	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	109.5	42	8.5	154851.5	42	67.5	462.5	-41.4	-1.3	-4.4	182.4	3

Office - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD W/m2	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	Elec	159	90.6	18.6	339105.4	97	62	516	-47.3	-1.5	-474.6	135.4	1
7	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	40	Elec	159	91.1	18.6	339242.9	97	62	516.1	-44.6	-1.4	-484.5	132.6	1
4	40	2.5	0.4	0.2	70	0	5.175	FC	Condensing	40	Elec	160.9	90.8	18.6	339338.8	96.9	63.9	516.4	-44.6	-1.4	-513.9	130.3	1
4	40	2.5	0.3	0.2	50	0	5.175	FC	Condensing	40	Elec	158.5	91.2	18.7	340408.2	97.4	61.1	515.8	-24.3	-0.8	-864.8	113	1
4	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	40	Elec	159.3	90.9	18.6	339035	96.9	62.4	516	-45.7	-1.5	-441.7	133.4	1
10	20	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	Elec	161.9	90.6	18.7	339688.2	97	64.9	516	-51.6	-1.7	-762.4	136.1	1
7	40	2.5	0.3	0.2	70	0	5.175	FC	Condensing	20	Elec	161.9	91.1	18.7	339825.7	97	64.9	516.1	-48.9	-1.6	-813.6	133.3	1
4	20	2.5	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	156.8	88.1	18.7	340046.3	97.4	59.4	544.2	-50	-1.6	-1041.9	137.2	1
4	20	2.5	0.3	0.1	70	0	5.175	FC	Condensing	20	Elec	162.2	90.9	18.7	339617.8	96.9	65.3	516	-50	-1.6	-699.1	134.1	1
4	40	2.5	0.4	0.2	70	0	5.175	FC	Condensing	20	Elec	163.8	90.8	18.7	339921.6	96.9	66.8	516.4	-48.9	-1.6	-891.8	131	1
10	20	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	Elec	123.1	52.7	10.6	193011.7	53.1	69.9	541	-11.8	-0.4	-1.5	141	2
10	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	126.7	50.7	10.2	185409.4	50.5	76.2	570.5	-11.8	-0.4	-1.4	132.8	2
7	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	Elec	129.1	52.5	10.7	193947.9	53.1	76.1	570	-11.8	-0.4	-1.5	129.9	2
7	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	124.7	52.5	11.9	215955.9	60.3	64.4	570	-11.8	-0.4	-1.7	135.4	2
7	40	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	122.9	51	11.5	210010.2	58.5	64.4	570.8	-9.1	-0.3	-1.3	134.8	2
10	40	1.2	0.3	0.1	70	0	5.175	FC	Condensing	20	NG	117.4	54.3	12.1	220123.3	62.1	55.3	512.4	-9.1	-0.3	-1.4	149.1	2
7	40	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.8	53	11.8	215671.2	60.6	58.2	540.2	-9.1	-0.3	-1.3	143.8	2
10	20	1.2	0.4	0.1	70	0	6.9	FC	Condensing	20	NG	122.5	50.7	11.4	208228.8	58	64.5	570.5	-11.8	-0.4	-1.6	138.1	2
10	20	1.2	0.4	0.1	70	0	5.175	FC	Condensing	20	NG	118.7	52.7	11.8	214992.3	60.4	58.3	541	-11.8	-0.4	-1.7	146.6	2
10	40	1.2	0.3	0.1	70	0	6.9	FC	Condensing	20	NG	120.8	52.1	11.7	212140.1	59.3	61.4	537.5	-9.1	-0.3	-1.3	141.7	2
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	NG	97.4	31.8	7.7	139390.1	37.8	59.5	547.6	22.6	0.7	2	137.7	3
40	40	1.6	0.4	0.1	70	80	5.175	FC	Condensing	20	Elec	99.4	31.8	6	109471.5	28.3	71.2	547.6	22.6	0.7	1.8	135	3
40	40	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	Elec	104.8	30.8	5.9	107539.2	27.3	77.5	582.4	22.6	0.7	1.8	124.1	3
40	40	1.6	0.3	0.1	70	80	6.9	FC	Condensing	20	Elec	105.1	33.3	6.4	117294.8	30.4	74.7	578.3	22.6	0.7	1.8	124.2	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	Elec	106.8	32.3	6.3	114224.8	29.3	77.5	582.5	19.9	0.6	1.6	124.3	3
20	20	1.2	0.4	0.1	70	80	6.9	FC	Condensing	20	Elec	100.5	25.8	4.9	88565	21.6	78.9	582.5	27.8	0.9	2	124	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	NG	104.6	32.3	7.9	143812.6	38.8	65.8	582.5	19.9	0.6	1.8	127	3
40	40	1.6	0.4	0.1	70	80	6.9	FC	Condensing	20	NG	102.8	30.8	7.6	137760.2	37	65.8	582.4	22.6	0.7	2	126.6	3
40	20	1.6	0.4	0.1	70	80	6.9	FC	Condensing	40	Elec	103.9	32.3	6.2	113642	29.3	74.6	582.5	24.1	0.8	1.9	123.6	3
40	40	1.6	0.4	0.1	70	80	6.9	FC	Condensing	40	Elec	101.9	30.8	5.9	106956.4	27.3	74.6	582.4	26.8	0.9	2.1	123.4	3

Hotel - Lowest ICC - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	Elec	Elec	157.8	48.2	3.5	1088.3	10.4	147.4	150	1.1	0	0	137.8	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	NG	Elec	157.8	48.2	8.3	3955.3	37.8	120	135.1	1.1	0	0	138.1	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	Elec	NG	197.6	48.2	20	10752.6	102.7	94.9	143.9	1.1	0	0	90.4	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	NG	NG	197.6	48.2	24.8	13619.6	130	67.6	129	1.1	0	0	90.7	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	NG	Elec	195.4	48.2	17.2	9071.8	86.6	108.8	129	1.1	0	0	93.1	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	Elec	Elec	195.4	48.2	12.5	6204.9	59.2	136.2	143.9	1.1	0	0	92.8	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	Elec	NG	197.6	48.2	20	10752.6	102.7	94.9	143.9	1.1	0	0	90.4	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	NG	NG	197.6	48.2	24.8	13619.6	130	67.6	129	1.1	0	0	90.7	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	195	45.6	24.3	13329.5	127.3	67.8	132.9	1.4	0	0.1	92.7	1
10	20	2.5	0.3	0.1	30	0	0	FC	Condensing	20	NG	NG	195.6	47.7	24.7	13567	129.5	66	122.9	1.4	0	0.1	94.4	1
10	40	2.5	0.3	0.2	30	60	20	FC	Condensing	20	NG	Elec	169.2	29.2	13.3	6909	66	103.2	110.5	17.5	0.5	0.6	113.7	2
10	40	2.5	0.4	0.2	30	60	20	FC	Condensing	20	NG	Elec	169.3	27.7	13.1	6742.3	64.4	105	116.5	17.5	0.5	0.6	112.1	2
10	40	2.5	0.4	0.2	30	60	40	FC	Condensing	20	NG	NG	169.5	29.4	21	11506.9	109.9	59.6	109.4	17.5	0.5	0.6	113.9	2
10	20	2.5	0.3	0.2	30	60	0	VAV	Condensing	20	NG	Elec	150	28.4	7.9	3752.7	35.8	114.2	120.9	15.1	0.5	0.5	137.2	2
10	20	2.5	0.4	0.2	30	60	0	VAV	Condensing	20	NG	Elec	151.6	27	7.9	3738.6	35.7	115.9	130.8	15.1	0.5	0.5	132.8	2
10	20	2.5	0.4	0.2	30	60	20	VAV	Condensing	20	NG	Elec	147.6	28.5	7.9	3756	35.9	111.7	124.4	15.1	0.5	0.5	139.3	2
10	40	2.5	0.4	0.2	30	60	40	FC	Condensing	20	Elec	NG	169.5	29.4	16.2	8640	82.5	87	124.3	17.5	0.5	0.5	113.6	2
10	20	2.5	0.4	0.2	30	60	20	VAV	Condensing	20	Elec	Elec	147.6	28.5	3.1	889.1	8.5	139.1	139.3	15.1	0.5	0.5	139	2
10	20	2.5	0.4	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	151.6	27	3.1	871.6	8.3	143.3	145.7	15.1	0.5	0.5	132.5	2
10	20	2.5	0.3	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	150	28.4	3.1	885.8	8.5	141.6	135.8	15.1	0.5	0.5	136.8	2
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.5	19.6	2.9	801.2	7.7	131.8	116.7	55.5	1.7	1.7	114.1	3
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	139.2	19.4	2.9	798.7	7.6	131.6	116.7	54.1	1.6	1.6	115.8	3
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.5	19.6	7.6	3668.2	35	104.5	101.8	55.5	1.7	2	114.5	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	138.8	19.5	7.6	3666.7	35	103.8	98.6	56.1	1.7	2	115.5	3
15	20	1.6	0.4	0.1	30	90	40	VAV	Condensing	20	NG	Elec	140	16.9	7.6	3641.3	34.8	105.2	109.5	65.5	2	2.3	101.9	3
15	20	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	138.5	18	7.6	3652.5	34.9	103.6	98.9	65.5	2	2.3	106.4	3
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	139.2	19.4	7.6	3665.6	35	104.2	101.8	54.1	1.6	1.9	116.2	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	138.8	19.5	2.9	799.7	7.6	131.2	113.5	56.1	1.7	1.7	115.1	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.1	19.7	7.6	3669.7	35	104.1	99.7	51.6	1.6	1.8	119.4	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.1	19.7	2.9	802.8	7.7	131.4	114.6	51.6	1.6	1.5	119	3

Hotel - Lowest ICC - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	209.7	58.3	14.7	7458.2	71.2	138.5	163.6	0.9	0	0	109.9	1
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	NG	Elec	206.2	59	19.6	10422.6	99.5	106.7	141.3	3.1	0.1	0.1	114.2	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	208.4	57.2	19.2	10199.5	97.4	111	146.8	3.1	0.1	0.1	110.1	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	209.7	58.3	19.5	10325.1	98.6	111.1	148.7	0.9	0	0	110.3	1
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	Elec	NG	208.4	59	22.4	12103.5	115.6	92.8	156.2	3.1	0.1	0.1	111.4	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	210.6	57.2	22.1	11880.3	113.4	97.1	161.7	3.1	0.1	0.1	107.3	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	211.8	58.3	22.3	12006	114.6	97.2	163.6	0.9	0	0	107.5	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	211.8	58.3	27	14872.9	142	69.8	148.7	0.9	0	0	107.9	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	210.6	57.2	26.8	14747.2	140.8	69.8	146.8	3.1	0.1	0.1	107.7	1
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	NG	NG	208.4	59	27.2	14970.4	142.9	65.4	141.3	3.1	0.1	0.1	111.7	1
10	40	2	0.4	0.1	30	60	0	FC	Condensing	40	NG	NG	167.2	27.2	18.7	10125.3	96.7	70.5	135.9	27.8	0.8	0.9	139.2	2
10	40	2	0.4	0.1	30	60	20	FC	Condensing	40	NG	NG	164.5	28.6	18.9	10305.4	98.4	66.1	128.9	27.8	0.8	0.9	144.3	2
10	20	2	0.4	0.1	30	60	20	FC	Condensing	40	NG	NG	165.7	29.7	19.1	10427.8	99.6	66.1	142.6	25.6	0.8	0.8	141.7	2
10	20	2	0.4	0.1	30	60	0	FC	Condensing	40	NG	NG	168.4	28.2	18.9	10246	97.8	70.6	136.6	25.6	0.8	0.8	139.8	2
10	20	2	0.3	0.1	30	60	0	FC	Condensing	40	Elec	NG	168	29.6	14.4	7544.1	72	96	146.1	25.6	0.8	0.7	141.2	2
10	20	2	0.4	0.1	30	60	0	FC	Condensing	40	Elec	NG	168.4	28.2	14.1	7379	70.5	98	151.4	25.6	0.8	0.7	139.4	2
10	20	2	0.4	0.1	30	60	20	FC	Condensing	40	Elec	NG	165.7	29.7	14.4	7560.9	72.2	93.5	157.5	25.6	0.8	0.7	141.4	2
10	40	2	0.3	0.1	30	60	0	FC	Condensing	40	Elec	NG	166.8	28.6	14.2	7421.5	70.9	95.9	144.8	27.8	0.8	0.8	140.8	2
10	40	2	0.3	0.1	30	60	0	FC	Condensing	40	NG	NG	166.8	28.6	18.9	10288.4	98.2	68.5	130	27.8	0.8	0.9	141.2	2
10	20	2	0.3	0.1	30	60	0	FC	Condensing	40	NG	NG	168	29.6	19.1	10411	99.4	68.6	131.2	25.6	0.8	0.8	141.6	2
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	Elec	NG	144.9	19.4	12.2	6405	61.2	83.7	117.9	82.9	2.5	2.3	119.3	3
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	144.9	19.4	17	9271.9	88.5	56.4	103	82.9	2.5	2.7	119.6	3
15	20	2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	143.7	20.9	13.3	7051	67.3	76.3	133	93	2.8	3.1	103.8	3
10	40	1.6	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.6	20	8.5	4149.4	39.6	104	140.4	94.8	2.9	2.7	103.4	3
10	20	1.6	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	144.2	21	8.5	4185.5	40	104.3	150.3	92.6	2.8	2.6	102.5	3
10	40	1.6	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	143.6	20	13.2	7016.4	67	76.6	125.5	94.8	2.9	3.1	103.8	3
10	20	1.6	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	144.2	21	13.3	7052.5	67.3	76.9	135.4	92.6	2.8	3	102.9	3
10	40	1.6	0.4	0.1	30	90	0	VAV	ASHP	40	NG	NG	144.1	20.4	14.2	7606.7	72.6	71.5	134	94.8	2.9	3.1	101.2	3
15	20	2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.7	20.9	8.5	4184.1	39.9	103.7	147.8	93	2.8	2.6	103.4	3
10	40	1.6	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	144.1	20.4	9.5	4739.8	45.3	98.8	148.9	94.8	2.9	2.7	100.9	3
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	130	12.3	13.6	7349.7	70.2	59.8	103.7	187	5.7	6.1	33.8	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.7	12.1	13.6	7343.9	70.1	59.6	102	263.2	8	8.7	-41.7	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.1	11	13.6	7306.5	69.8	59.4	101.2	265.4	8.1	8.7	-43	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	130	12.3	8.9	4482.7	42.8	87.2	118.5	187	5.7	5.3	33.5	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.7	12.1	8.9	4477	42.7	87	116.9	263.2	8	7.4	-42.1	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.1	11	8.8	4439.6	42.4	86.7	116.1	265.4	8.1	7.5	-43.3	4

Hotel - Lowest ICC - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	231.4	82	19.5	10203.3	97.4	133.9	146.8	6	0.2	0.1	90.9	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	231.4	82	24.3	13070.3	124.8	106.6	131.9	6	0.2	0.2	91.3	1
10	20	2	0.4	0.1	30	0	20	FC	Condensing	20	Elec	NG	228.3	80.6	26.8	14624.8	139.6	88.6	140	10.1	0.3	0.3	92.5	1
10	20	2	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	229.7	78.3	26.4	14340.5	136.9	92.8	147	10.1	0.3	0.3	89.1	1
10	20	2	0.3	0.1	30	0	0	FC	Condensing	20	Elec	NG	231.7	81.2	26.9	14672.4	140.1	91.6	136.6	10.1	0.3	0.3	89.1	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	233.5	82	27.1	14751.1	140.8	92.7	146.8	6	0.2	0.2	88.5	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	233.5	82	31.8	17618.1	168.2	65.3	131.9	6	0.2	0.2	88.8	1
10	20	2	0.4	0.1	30	0	20	FC	Condensing	20	NG	NG	228.3	80.6	31.6	17491.8	167	61.2	125.2	10.1	0.3	0.3	92.9	1
10	20	2	0.3	0.1	30	0	0	FC	Condensing	20	NG	NG	231.7	81.2	31.7	17539.3	167.5	64.2	121.7	10.1	0.3	0.3	89.5	1
10	20	2	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	229.7	78.3	31.1	17207.4	164.3	65.4	132.1	10.1	0.3	0.3	89.4	1
15	40	2	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	162.4	28.6	18.9	10309.8	98.4	63.9	112.7	66.7	2	1.9	120.6	2
15	20	2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	163.8	28.3	18.9	10294.3	98.3	65.5	120.9	64.1	2	1.8	119.5	2
10	20	1.6	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	164.3	28.4	18.9	10305.6	98.4	65.9	123.9	65.5	2	1.9	116.7	2
10	20	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	164.3	28.4	14.2	7438.7	71	93.3	138.8	65.5	2	1.6	116.4	2
15	20	2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	163.8	28.3	14.1	7427.4	70.9	92.9	135.8	64.1	2	1.6	119.2	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	20	Elec	Elec	168.9	28.7	8.6	4070.3	38.9	130	124.7	62.5	1.9	1.5	116.9	2
10	40	1.6	0.4	0.1	30	90	20	FC	Condensing	20	Elec	Elec	169.4	28.8	8.6	4080.8	39	130.4	129.6	63.9	1.9	1.6	113.7	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	20	NG	Elec	168.9	28.7	13.4	6937.2	66.2	102.6	109.9	62.5	1.9	1.8	117.3	2
15	40	2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	162.2	26.9	18.6	10128	96.7	65.5	119.9	66.7	2	1.9	119.1	2
10	40	1.6	0.4	0.1	30	90	20	FC	Condensing	20	NG	Elec	169.4	28.8	13.4	6947.7	66.3	103	114.7	63.9	1.9	1.8	114.1	2
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.7	24.9	8.8	4323.2	41.3	103.4	132.3	129.1	3.9	3.2	78.5	3
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	144.7	24.9	13.5	7190.1	68.7	76.1	117.4	129.1	3.9	3.6	78.9	3
15	20	1.2	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	140.6	24.4	8.7	4314	41.2	99.4	122.5	146.7	4.5	3.6	68.3	3
15	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	143.8	22.7	8.6	4250.4	40.6	103.2	133.1	146.7	4.5	3.6	61.8	3
15	20	1.2	0.4	0.1	30	90	40	FC	ASHP	40	NG	NG	138.3	24.7	13.5	7199.7	68.7	69.6	110	146.7	4.5	4.1	70.9	3
15	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	141.5	23	13.4	7133.4	68.1	73.4	118.8	146.7	4.5	4.1	64.9	3
15	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	144.8	21.4	13.3	7073.1	67.5	77.2	126.8	146.7	4.5	4.1	58.9	3
15	20	1.2	0.3	0.1	30	90	20	FC	ASHP	40	NG	NG	140.6	24.4	13.5	7180.9	68.6	72	107.6	146.7	4.5	4.1	68.6	3
15	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.8	21.4	8.6	4206.2	40.2	104.6	141.7	146.7	4.5	3.6	58.5	3
15	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	143.8	22.7	13.4	7117.3	68	75.8	118.2	146.7	4.5	4.1	62.2	3
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	128.7	15.3	9.1	4599.1	43.9	84.7	107.9	321.6	9.8	7.9	-88.2	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.8	17.2	13.9	7528.4	71.9	57.9	93.1	226.6	6.9	6.4	5.7	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	16.8	13.9	7516.5	71.8	57.7	96.3	318.9	9.7	9	-87	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	128.7	15.3	13.8	7466	71.3	57.4	93	321.6	9.8	9.1	-87.9	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	14.3	13.8	7431	71	58.5	103.4	321.6	9.8	9.1	-91.4	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.8	17.2	9.2	4661.5	44.5	85.2	108	226.6	6.9	5.6	5.3	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	16.8	9.1	4649.6	44.4	85.1	111.2	318.9	9.7	7.9	-87.4	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	14.3	9	4564.1	43.6	85.9	118.3	321.6	9.8	7.9	-91.7	4

Hotel - Lowest ICC - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	216.7	65.6	23.8	12879.6	123	93.7	138.9	5.1	0.2	0.1	79.6	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	218.6	67.3	24.1	13082.3	124.9	93.7	137.4	2.4	0.1	0.1	80.2	1
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	Elec	214.5	65.6	21	11198.8	106.9	107.6	124	5.1	0.2	0.2	82.4	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	Elec	216.4	67.3	21.3	11401.5	108.9	107.6	122.6	2.4	0.1	0.1	83	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	NG	218.6	67.3	28.9	15949.2	152.3	66.3	122.6	2.4	0.1	0.1	80.6	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	Elec	216.4	67.3	16.6	8534.5	81.5	135	137.4	2.4	0.1	0.1	82.6	1
10	20	2.5	0.3	0.1	30	60	20	FC	Condensing	20	NG	NG	211.2	65.4	28.5	15744.3	150.3	60.8	106.4	5.4	0.2	0.2	90.7	1
10	20	2.5	0.3	0.1	30	60	0	FC	Condensing	20	NG	NG	212.8	63.3	28.1	15486.4	147.9	64.9	113.5	5.4	0.2	0.2	87	1
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	NG	216.7	65.6	28.5	15746.6	150.3	66.3	124	5.1	0.2	0.2	80	1
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	Elec	214.5	65.6	16.2	8331.9	79.6	134.9	138.9	5.1	0.2	0.1	82	1
15	20	1.2	0.4	0.1	30	90	40	FC	Condensing	20	NG	Elec	169.7	31.7	14.1	7357.6	70.3	99.4	106.6	74.1	2.3	2.4	73	2
15	40	1.2	0.3	0.1	30	90	20	FC	Condensing	20	NG	Elec	169.7	29.7	13.7	7107.4	67.9	101.9	103.3	76.8	2.3	2.5	71	2
15	40	1.2	0.3	0.1	30	90	40	FC	Condensing	20	NG	Elec	167.9	31.6	14.1	7345.4	70.1	97.8	96.8	76.8	2.3	2.5	74.9	2
10	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	168.1	30.8	19.5	10620.4	101.4	66.7	120.5	71.9	2.2	2.4	74	2
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	167.7	30.9	14.7	7759.7	74.1	93.6	133	60.7	1.8	1.7	85.9	2
10	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	168.1	30.8	14.7	7753.5	74	94.1	135.4	71.9	2.2	2	73.6	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	20	Elec	NG	169.9	30	16.6	8838.4	84.4	85.5	117.7	76.8	2.3	2.2	70.8	2
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	167.7	30.9	19.5	10626.6	101.5	66.3	118.1	60.7	1.8	2	86.2	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	20	NG	NG	169.9	30	21.3	11705.3	111.8	58.2	102.8	76.8	2.3	2.5	71.1	2
15	20	1.2	0.4	0.1	30	90	40	FC	Condensing	20	Elec	Elec	169.7	31.7	9.3	4490.7	42.9	126.8	121.5	74.1	2.3	2.1	72.6	2
20	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	146.3	27.5	9	4434.6	42.3	104	126.3	158.8	4.8	4.4	15.7	3
20	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.4	25.9	8.9	4372.7	41.8	107.7	134.8	158.8	4.8	4.4	9.9	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	149.9	26.5	13.7	7258.2	69.3	80.6	122.8	129.8	4	4.2	37.9	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.9	26.5	8.9	4391.3	41.9	107.9	137.7	129.8	4	3.6	37.6	3
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	149	28	9	4441.3	42.4	106.6	130.3	129.8	4	3.6	40.4	3
20	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	146.3	27.5	13.7	7301.5	69.7	76.6	111.5	158.8	4.8	5.2	16.1	3
20	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	149.4	25.9	13.7	7239.6	69.1	80.3	119.9	158.8	4.8	5.2	10.2	3
20	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	148.5	27.3	13.7	7288.2	69.6	78.9	113.9	158.8	4.8	5.2	12.8	3
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	149	28	13.8	7308.3	69.8	79.2	115.4	129.8	4	4.2	40.8	3
20	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	148.5	27.3	9	4421.3	42.2	106.3	128.7	158.8	4.8	4.4	12.4	3
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	143.4	18.8	8.4	4132	39.5	104	127.4	299.6	9.1	8.4	-121.8	4
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.7	17.7	8.4	4095.8	39.1	105.5	129.5	299.6	9.1	8.4	-123.8	4
30	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	141.5	19.1	8.5	4149.8	39.6	101.8	128.3	299.6	9.1	8.4	-119.5	4
30	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	141.5	19.1	13.2	7016.7	67	74.5	113.4	299.6	9.1	9.7	-119.1	4
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	144.7	17.7	13.2	6962.8	66.5	78.2	114.6	299.6	9.1	9.7	-123.4	4
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	143.4	18.8	13.2	6998.9	66.8	76.6	112.5	299.6	9.1	9.7	-121.4	4
30	40	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	NG	NG	141.6	19.4	14.2	7598.8	72.6	69	124.7	299.6	9.1	9.8	-122.2	4
30	40	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	141.6	19.4	9.4	4731.9	45.2	96.4	139.6	299.6	9.1	8.4	-122.5	4
15	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	NG	142	19.1	8.5	4149.3	39.6	102.3	122.1	175.4	5.3	4.9	5.6	4
15	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	Elec	NG	143.9	18.7	8.4	4129.9	39.4	104.5	130.6	175.4	5.3	4.9	1.1	4

Hotel - Lowest ICC - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	Elec	NG	237.7	85.1	27.8	15180.6	144.9	92.7	137.5	6.2	0.2	0.2	76.2	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	NG	Elec	235.5	85.1	25	13499.8	128.9	106.6	122.7	6.2	0.2	0.2	78.9	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	Elec	234.5	82.6	24.6	13227.3	126.3	108.2	131.2	6.2	0.2	0.2	78.1	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	NG	Elec	232.7	84.8	25	13483.4	128.7	104	124.9	6.2	0.2	0.2	81.8	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	NG	236.7	82.6	32.1	17775.1	169.7	66.9	131.2	6.2	0.2	0.2	75.7	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	NG	NG	234.9	84.8	32.5	18031.1	172.2	62.7	124.9	6.2	0.2	0.2	79.4	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	236.7	82.6	27.4	14908.2	142.3	94.3	146.1	6.2	0.2	0.2	75.3	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	NG	NG	237.7	85.1	32.6	18047.5	172.3	65.3	122.7	6.2	0.2	0.2	76.5	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	Elec	Elec	235.5	85.1	20.3	10632.8	101.5	134	137.5	6.2	0.2	0.2	78.6	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	Elec	NG	234.9	84.8	27.8	15164.2	144.8	90.1	139.7	6.2	0.2	0.2	79.1	1
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	169	31	14.9	7832.4	74.8	94.2	149.9	150.2	4.6	3.9	13.9	2
15	20	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	169.1	30.6	14.8	7796.9	74.4	94.6	150.5	161.7	4.9	4.2	2.2	2
15	20	0.8	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	168.6	31.9	15	7941.4	75.8	92.8	139.3	161.7	4.9	4.2	5.5	2
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	169	31	19.6	10699.3	102.2	66.9	135	150.2	4.6	4.5	14.3	2
15	40	0.8	0.4	0.1	30	90	20	FC	Condensing	40	NG	NG	164.9	30.3	19.5	10646.5	101.7	63.2	125.3	165.2	5	5	6.8	2
15	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	166.9	28.6	19.2	10436	99.6	67.3	135.9	165.2	5	5	1.7	2
15	40	0.8	0.3	0.1	30	90	20	FC	Condensing	40	NG	NG	164.4	31.6	19.7	10797.1	103.1	61.3	117	165.2	5	5	9.3	2
15	40	0.8	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	166.4	29.9	19.4	10577.3	101	65.4	125.4	165.2	5	5	4.8	2
15	20	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	169.1	30.6	19.6	10663.8	101.8	67.3	135.6	161.7	4.9	4.9	2.5	2
15	20	0.8	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	168.6	31.9	19.8	10808.3	103.2	65.4	124.4	161.7	4.9	4.9	5.8	2
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	148.7	27.7	13.8	7324.3	69.9	78.7	130.3	270.2	8.2	8.1	-79.6	3
30	20	0.8	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	149.8	26.5	13.7	7280.6	69.5	80.3	126.2	390.8	11.9	11.7	-200.5	3
30	20	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	148	27	13.8	7302.4	69.7	78.3	128.5	390.8	11.9	11.7	-198.8	3
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	148.5	24.5	13.6	7211.8	68.9	79.6	125	394.3	12	11.8	-202.1	3
30	40	0.8	0.3	0.1	30	90	20	FC	ASHP	40	NG	NG	145.6	26.2	13.7	7274.1	69.5	76.2	116.4	394.3	12	11.8	-196.5	3
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148.7	27.7	9	4457.4	42.6	106.1	145.2	270.2	8.2	7	-79.9	3
30	20	0.8	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.8	26.5	9	4413.7	42.1	107.6	141.1	390.8	11.9	10.1	-200.9	3
30	20	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148	27	9	4435.4	42.3	105.7	143.3	390.8	11.9	10.1	-199.2	3
30	20	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	NG	NG	148.4	27.3	14.7	7882.6	75.3	73.1	136.4	390.8	11.9	11.7	-201.2	3
30	20	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	148.4	27.3	10	5015.6	47.9	100.5	151.2	390.8	11.9	10.2	-201.5	3
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	NG	143.9	19.9	14.3	7631.9	72.9	71	135.2	397.4	12.1	11.9	-202	4
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	NG	143.6	19.7	8.5	4187.1	40	103.6	144.4	397.4	12.1	10.3	-200.6	4
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	NG	143.6	19.7	13.3	7054	67.4	76.2	129.5	397.4	12.1	11.9	-200.3	4
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec	NG	143.9	19.9	9.5	4765	45.5	98.4	150	397.4	12.1	10.3	-202.3	4

Hotel - Lowest ICC - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.4	0.2	50	60	40	FC	Condensing	20	Elec	255.5	103.1	31.7	17419	166.3	89.2	166.4	-145.6	-4.4	-3.7	219.2	1
10	20	1.6	0.4	0.2	50	60	20	FC	Condensing	20	Elec	257	100.8	31.3	17125.7	163.5	93.5	175.7	-145.6	-4.4	-3.7	215.1	1
10	20	1.6	0.4	0.2	50	60	0	FC	Condensing	20	Elec	258.8	98.6	30.8	16852.5	160.9	97.9	189.5	-145.6	-4.4	-3.7	209.6	1
10	20	1.6	0.3	0.2	50	60	0	FC	Condensing	20	Elec	259.8	102.2	31.5	17262.3	164.8	95	162.8	-145.6	-4.4	-3.7	214.7	1
10	20	1.6	0.4	0.2	50	60	20	FC	Condensing	20	NG	257	100.8	36	19992.6	190.9	66.1	160.8	-145.6	-4.4	-4.2	215.5	1
10	20	1.6	0.4	0.2	50	60	40	FC	Condensing	20	NG	255.5	103.1	36.5	20285.9	193.7	61.8	151.5	-145.6	-4.4	-4.2	219.6	1
10	20	1.6	0.3	0.2	50	60	0	FC	Condensing	20	NG	257.7	102.2	28.7	15581.4	148.8	108.9	147.9	-145.6	-4.4	-4.2	217.5	1
10	20	1.6	0.4	0.2	50	60	0	FC	Condensing	20	NG	258.8	98.6	35.6	19719.4	188.3	70.5	174.6	-145.6	-4.4	-4.2	210	1
10	20	1.6	0.3	0.2	50	60	0	FC	Condensing	20	NG	259.8	102.2	36.3	20129.2	192.2	67.6	147.9	-145.6	-4.4	-4.2	215.1	1
10	20	1.6	0.4	0.2	50	60	0	FC	Condensing	20	NG	256.6	98.6	28	15171.6	144.9	111.8	174.6	-145.6	-4.4	-4.2	212.4	1
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	169.1	31.1	15	7904.1	75.5	93.7	156.5	308.5	9.4	7.6	-125.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	NG	166.3	31.1	16.1	8587	82	84.3	148.4	366.6	11.2	10.3	-181.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	NG	155.4	31.1	14.1	7450	71.1	84.3	148.4	372.2	11.3	10.4	-174	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	Elec	164.1	31.1	3.8	1172.3	11.2	152.9	163.3	366.6	11.2	8.9	-179.7	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	155.4	31.1	9.3	4583.1	43.8	111.7	163.3	372.2	11.3	9.1	-174.3	2
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	169.1	31.1	19.8	10771	102.8	66.3	141.6	308.5	9.4	8.7	-125.5	2
30	40	0.8	0.3	0.01	30	90	0	VAV	ASHP	40	NG	148	27.3	14.8	7899.7	75.4	72.6	129.8	375.3	11.4	10.5	-163.4	3
30	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	NG	149.9	25.3	13.7	7254.8	69.3	80.7	135.1	375.3	11.4	10.5	-167.1	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	NG	147.1	27	13.8	7319.3	69.9	77.2	125.5	375.3	11.4	10.5	-161.3	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	148.2	25.9	13.7	7281.5	69.5	78.7	138.6	375.3	11.4	10.5	-165.8	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	NG	145.3	27.7	13.8	7347.6	70.2	75.2	130.8	375.3	11.4	10.5	-160.4	3
30	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	Elec	149.9	25.3	8.9	4387.8	41.9	108	150	375.3	11.4	9.2	-167.5	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	Elec	147.1	27	9	4452.4	42.5	104.6	140.4	375.3	11.4	9.2	-161.7	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	148.2	25.9	9	4414.6	42.2	106.1	153.5	375.3	11.4	9.2	-166.2	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	Elec	145.3	27.7	9	4480.7	42.8	102.5	145.7	375.3	11.4	9.2	-160.7	3
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	148.7	26.2	14.7	7859.9	75	73.7	138.6	375.3	11.4	10.5	-166.4	3

Hotel - Highest NPV - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2	0.3	0.1	30	0	40	VAV	Condensing	20	NG	Elec	147.5	48.2	8.2	3959.6	37.8	109.7	110.9	7.3	0.2	0.3	150.4	1
10	40	2.5	0.3	0.2	30	60	40	VAV	Condensing	20	NG	Elec	142.6	31	7.9	3782.1	36.1	106.5	104.8	17.5	0.5	0.6	147.9	1
10	40	2.5	0.3	0.2	30	60	40	VAV	Condensing	20	Elec	Elec	142.6	31	3.1	915.1	8.7	133.9	119.7	17.5	0.5	0.5	147.5	1
10	40	2.5	0.4	0.1	30	0	40	VAV	Condensing	20	NG	Elec	149	48.6	8.2	3962.5	37.8	111.2	118.8	3.8	0.1	0.1	150.3	1
10	40	2	0.3	0.1	30	0	40	VAV	Condensing	20	NG	Elec	147.2	47.3	8.2	3950.1	37.7	109.5	111.3	9.7	0.3	0.3	148.4	1
10	20	2.5	0.3	0.2	30	60	40	VAV	Condensing	20	NG	Elec	142.9	31.9	7.9	3791.5	36.2	106.7	104.8	15.1	0.5	0.5	149.8	1
10	40	2	0.3	0.1	30	0	40	VAV	Condensing	20	Elec	Elec	147.2	47.3	3.4	1083.2	10.3	136.9	126.1	9.7	0.3	0.3	148.1	1
10	40	2.5	0.4	0.1	30	0	40	VAV	Condensing	20	Elec	Elec	149	48.6	3.5	1095.5	10.5	138.6	133.7	3.8	0.1	0.1	149.9	1
10	20	2	0.3	0.1	30	0	40	VAV	Condensing	20	Elec	Elec	147.5	48.2	3.4	1092.6	10.4	137.1	125.8	7.3	0.2	0.2	150.1	1
10	20	2.5	0.3	0.2	30	60	40	VAV	Condensing	20	Elec	Elec	142.9	31.9	3.1	924.6	8.8	134.1	119.7	15.1	0.5	0.5	149.5	1
10	20	2	0.3	0.2	30	60	40	VAV	Condensing	20	Elec	Elec	142	28.7	3	892.6	8.5	133.5	118.7	21	0.6	0.6	144.9	2
10	20	2.5	0.4	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	143.2	27.1	3	876.6	8.4	134.8	127.3	17.8	0.5	0.5	144.7	2
10	20	2.5	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	142	28.6	3	891.3	8.5	133.4	117.9	17.8	0.5	0.5	148.5	2
10	40	2.5	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	141.6	27.7	3	882	8.4	133.2	118	20.1	0.6	0.6	146.5	2
10	40	2.5	0.4	0.2	30	60	40	VAV	Condensing	20	NG	Elec	143.8	29.4	7.8	3766.3	36	107.8	113.2	17.5	0.5	0.6	144.4	2
10	40	2.5	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	141.6	27.7	7.8	3748.9	35.8	105.9	103.2	20.1	0.6	0.7	146.9	2
10	20	2	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	141.1	25.4	7.7	3727.1	35.6	105.6	102.5	23.7	0.7	0.8	144.1	2
10	20	2	0.3	0.2	30	60	40	VAV	Condensing	20	NG	Elec	142	28.7	7.8	3759.5	35.9	106.1	103.8	21	0.6	0.7	145.3	2
10	20	2.5	0.4	0.1	30	60	40	VAV	Condensing	20	NG	Elec	143.2	27.1	7.8	3743.6	35.7	107.5	112.4	17.8	0.5	0.6	145	2
10	20	2.5	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	142	28.6	7.8	3758.2	35.9	106.1	103.1	17.8	0.5	0.6	148.8	2
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.5	19.6	2.9	801.2	7.7	131.8	116.7	55.5	1.7	1.7	114.1	3
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	139.2	19.4	2.9	798.7	7.6	131.6	116.7	54.1	1.6	1.6	115.8	3
15	20	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	138.5	18	2.8	785.6	7.5	131	113.8	65.5	2	2	106	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	138.8	19.5	7.6	3666.7	35	103.8	98.6	56.1	1.7	2	115.5	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	138.8	19.5	2.9	799.7	7.6	131.2	113.5	56.1	1.7	1.7	115.1	3
15	20	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	138.5	18	7.6	3652.5	34.9	103.6	98.9	65.5	2	2.3	106.4	3
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.5	19.6	7.6	3668.2	35	104.5	101.8	55.5	1.7	2	114.5	3
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	139.2	19.4	7.6	3665.6	35	104.2	101.8	54.1	1.6	1.9	116.2	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.1	19.7	7.6	3669.7	35	104.1	99.7	51.6	1.6	1.8	119.4	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.1	19.7	2.9	802.8	7.7	131.4	114.6	51.6	1.6	1.5	119	3

Hotel - Highest NPV - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	161.8	31.8	19.5	10669.1	101.9	59.9	125.7	27.8	0.8	0.9	148.4	1
10	20	2.5	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	166.7	36.4	20.4	11180.9	106.8	59.9	128.4	19.9	0.6	0.7	149.6	1
10	40	2.5	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	165.4	35.3	20.2	11054	105.5	59.8	124.8	22.2	0.7	0.7	149.8	1
10	20	2.5	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	166.7	36.4	15.6	8314	79.4	87.3	143.3	19.9	0.6	0.6	149.2	1
10	20	2	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	163.1	32.9	15	7928.3	75.7	87.4	144.1	25.6	0.8	0.7	147.9	1
10	40	2.5	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	165.4	35.3	15.4	8187.1	78.2	87.2	139.7	22.2	0.7	0.6	149.4	1
10	40	2	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	161.8	31.8	14.7	7802.2	74.5	87.3	140.6	27.8	0.8	0.8	148.1	1
10	20	2.5	0.4	0.1	30	60	40	FC	Condensing	40	NG	NG	166.7	34.7	20.1	10993	105	61.7	138.1	19.9	0.6	0.7	147.2	1
10	40	2.5	0.3	0.1	30	60	20	FC	Condensing	40	NG	NG	167.7	33.6	19.9	10856.4	103.7	64.1	122.1	22.2	0.7	0.7	147.6	1
10	20	2	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	163.1	32.9	19.7	10795.2	103.1	60	129.3	25.6	0.8	0.9	148.2	1
10	20	2.5	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	159.4	29.8	19.1	10448.1	99.8	59.7	125.2	35.5	1.1	1.2	143.8	2
10	40	2	0.3	0.1	30	90	20	VAV	Condensing	40	NG	NG	155.9	25.9	18.3	9977.1	95.3	60.6	110.6	43.3	1.3	1.4	143.8	2
10	40	2.5	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	158.2	28.7	18.9	10321.1	98.5	59.6	118.9	37.7	1.1	1.3	144.7	2
10	40	2	0.3	0.1	30	90	20	VAV	Condensing	40	Elec	NG	155.9	25.9	13.5	7110.2	67.9	88	125.5	43.3	1.3	1.2	143.5	2
10	20	2	0.4	0.1	30	90	40	VAV	Condensing	40	Elec	NG	155.4	27.3	13.8	7288	69.6	85.9	135.3	41.1	1.3	1.2	143.9	2
10	20	2	0.4	0.1	30	90	40	VAV	Condensing	40	NG	NG	155.4	27.3	18.6	10154.9	97	58.5	120.4	41.1	1.3	1.4	144.3	2
10	40	2	0.4	0.1	30	60	20	FC	Condensing	40	Elec	NG	164.5	28.6	14.2	7438.5	71	93.5	143.8	27.8	0.8	0.8	143.9	2
10	40	2.5	0.3	0.1	30	90	40	FC	Condensing	40	Elec	NG	158.2	28.7	14.1	7454.2	71.2	87	133.7	37.7	1.1	1.1	144.3	2
10	40	2	0.4	0.1	30	60	20	FC	Condensing	40	NG	NG	164.5	28.6	18.9	10305.4	98.4	66.1	128.9	27.8	0.8	0.9	144.3	2
10	20	2	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	155.4	28.8	18.9	10327.5	98.6	56.8	122.9	41.1	1.3	1.4	143.7	2
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	144.9	19.4	17	9271.9	88.5	56.4	103	82.9	2.5	2.7	119.6	3
15	20	2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	143.7	20.9	13.3	7051	67.3	76.3	133	93	2.8	3.1	103.8	3
15	20	2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.7	20.9	8.5	4184.1	39.9	103.7	147.8	93	2.8	2.6	103.4	3
10	40	1.6	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.6	20	8.5	4149.4	39.6	104	140.4	94.8	2.9	2.7	103.4	3
15	40	2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	143.1	19.9	13.2	7014.7	67	76.1	122.9	95.2	2.9	3.1	104.7	3
10	40	1.6	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	143.6	20	13.2	7016.4	67	76.6	125.5	94.8	2.9	3.1	103.8	3
10	20	1.6	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	144.2	21	13.3	7052.5	67.3	76.9	135.4	92.6	2.8	3	102.9	3
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	Elec	NG	144.9	19.4	12.2	6405	61.2	83.7	117.9	82.9	2.5	2.3	119.3	3
15	40	2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.1	19.9	8.5	4147.8	39.6	103.5	137.8	95.2	2.9	2.7	104.3	3
15	40	2	0.4	0.1	30	90	0	VAV	ASHP	40	NG	NG	143.6	20.3	14.2	7604.2	72.6	71	128.2	95.2	2.9	3.1	102.9	3
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	130	12.3	13.6	7349.7	70.2	59.8	103.7	187	5.7	6.1	33.8	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.7	12.1	13.6	7343.9	70.1	59.6	102	263.2	8	8.7	-41.7	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.1	11	13.6	7306.5	69.8	59.4	101.2	265.4	8.1	8.7	-43	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	130	12.3	8.9	4482.7	42.8	87.2	118.5	187	5.7	5.3	33.5	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.7	12.1	8.9	4477	42.7	87	116.9	263.2	8	7.4	-42.1	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.1	11	8.8	4439.6	42.4	86.7	116.1	265.4	8.1	7.5	-43.3	4

Hotel - Highest NPV - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	174.4	46.3	17.7	9481.7	90.5	83.9	116	35.8	1.1	0.9	139.1	1
10	40	2.5	0.4	0.1	30	60	40	FC	Condensing	40	Elec	NG	178.6	49	18.2	9783.2	93.4	85.2	120.9	29	0.9	0.7	139.6	1
10	20	2.5	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	181.4	52.8	23.7	13085.1	124.9	56.5	103.9	26.3	0.8	0.8	139.6	1
10	20	2.5	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	181.4	52.8	19	10218.1	97.6	83.9	118.8	26.3	0.8	0.7	139.2	1
10	20	2.5	0.4	0.1	30	60	40	FC	Condensing	40	NG	NG	180.3	50.5	23.3	12826.9	122.5	57.8	110.6	26.3	0.8	0.8	139.4	1
10	20	2	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	176.1	47.8	22.7	12523.2	119.6	56.5	105	33.1	1	0.9	139.1	1
10	40	2.5	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	179.7	51.3	23.4	12908	123.2	56.5	101.7	29	0.9	0.8	139.6	1
10	40	2.5	0.4	0.1	30	60	40	FC	Condensing	40	NG	NG	178.6	49	23	12650.2	120.8	57.8	106	29	0.9	0.8	139.9	1
10	40	2	0.3	0.1	30	60	40	FC	Condensing	40	NG	NG	174.4	46.3	22.4	12348.6	117.9	56.5	101.1	35.8	1.1	1	139.5	1
10	40	2.5	0.3	0.1	30	60	40	FC	Condensing	40	Elec	NG	179.7	51.3	18.7	10041.1	95.9	83.9	116.5	29	0.9	0.7	139.2	1
10	40	1.6	0.4	0.1	30	90	20	FC	Condensing	40	NG	NG	160.7	28.8	19	10358.6	98.9	61.8	114.7	68.1	2.1	1.9	120.8	2
15	40	2	0.4	0.1	30	90	0	VAV	Condensing	40	Elec	NG	160.5	29.1	14.2	7482.5	71.4	89.1	135.9	66.7	2	1.7	120.5	2
15	40	2	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	162.4	28.6	18.9	10309.8	98.4	63.9	112.7	66.7	2	1.9	120.6	2
15	40	1.6	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	155	28.6	18.9	10367.5	99	56	98	80.3	2.4	2.3	119.7	2
10	40	1.6	0.4	0.1	30	90	20	FC	Condensing	40	Elec	NG	160.7	28.8	14.2	7491.6	71.5	89.2	129.6	68.1	2.1	1.7	120.4	2
15	20	2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	163.8	28.3	18.9	10294.3	98.3	65.5	120.9	64.1	2	1.8	119.5	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	40	Elec	NG	160.2	28.7	14.2	7481.1	71.4	88.7	124.7	66.7	2	1.7	123.6	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	40	NG	NG	160.2	28.7	19	10348	98.8	61.4	109.9	66.7	2	1.9	124	2
15	40	2	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	162.4	28.6	14.2	7442.9	71.1	91.3	127.6	66.7	2	1.7	120.2	2
15	40	2	0.4	0.1	30	90	0	VAV	Condensing	40	NG	NG	160.5	29.1	19	10349.4	98.8	61.7	121.1	66.7	2	1.9	120.9	2
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	144.7	24.9	13.5	7190.1	68.7	76.1	117.4	129.1	3.9	3.6	78.9	3
15	20	1.2	0.4	0.1	30	90	40	FC	ASHP	40	NG	NG	138.3	24.7	13.5	7199.7	68.7	69.6	110	146.7	4.5	4.1	70.9	3
15	20	1.2	0.3	0.1	30	90	20	FC	ASHP	40	NG	NG	140.6	24.4	13.5	7180.9	68.6	72	107.6	146.7	4.5	4.1	68.6	3
15	20	1.2	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	140.6	24.4	8.7	4314	41.2	99.4	122.5	146.7	4.5	3.6	68.3	3
15	20	1.2	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	138.3	24.7	8.7	4332.8	41.4	97	124.8	146.7	4.5	3.6	70.5	3
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.7	24.9	8.8	4323.2	41.3	103.4	132.3	129.1	3.9	3.2	78.5	3
15	40	1.2	0.3	0.1	30	90	40	FC	ASHP	40	Elec	NG	136.8	24.8	8.7	4332.8	41.4	95.5	116.6	149.4	4.6	3.7	71.7	3
15	40	1.2	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	137.5	23.3	8.6	4282.7	40.9	96.6	121.9	149.4	4.6	3.7	69.6	3
15	40	1.2	0.4	0.1	30	90	40	FC	ASHP	40	NG	NG	137.5	23.3	13.4	7149.6	68.3	69.2	107	149.4	4.6	4.2	69.9	3
15	40	1.2	0.3	0.1	30	90	40	FC	ASHP	40	NG	NG	136.8	24.8	13.5	7199.7	68.7	68.1	101.8	149.4	4.6	4.2	72	3
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	128.7	15.3	9.1	4599.1	43.9	84.7	107.9	321.6	9.8	7.9	-88.2	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.8	17.2	13.9	7528.4	71.9	57.9	93.1	226.6	6.9	6.4	5.7	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	16.8	13.9	7516.5	71.8	57.7	96.3	318.9	9.7	9	-87	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	128.7	15.3	13.8	7466	71.3	57.4	93	321.6	9.8	9.1	-87.9	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	14.3	13.8	7431	71	58.5	103.4	321.6	9.8	9.1	-91.4	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.8	17.2	9.2	4661.5	44.5	85.2	108	226.6	6.9	5.6	5.3	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	16.8	9.1	4649.6	44.4	85.1	111.2	318.9	9.7	7.9	-87.4	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	14.3	9	4564.1	43.6	85.9	118.3	321.6	9.8	7.9	-91.7	4

Hotel - Highest NPV - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	NG		182.5	56.1	24.4	13479.3	128.7	53.8	93.5	28.5	0.9	0.9	106	1
10	40	2	0.3	0.1	30	90	40	VAV	Condensing	40	Elec		174.3	48.5	18.1	9753.1	93.1	81.2	106.6	37.9	1.2	1.1	106.7	1
10	40	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	NG		180.5	54.3	24	13272.8	126.7	53.7	91.8	31.2	0.9	1	106.2	1
10	40	2	0.3	0.1	30	90	40	VAV	Condensing	40	NG		174.3	48.5	22.9	12620	120.5	53.8	91.7	37.9	1.2	1.3	107.1	1
10	20	2	0.3	0.1	30	90	40	VAV	Condensing	40	Elec		176.3	50.3	18.5	9960.2	95.1	81.2	108.6	35.3	1.1	1	106.4	1
10	40	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	Elec		180.5	54.3	19.3	10405.8	99.4	81.1	106.7	31.2	0.9	0.9	105.8	1
10	20	2	0.3	0.1	30	90	40	VAV	Condensing	40	NG		176.3	50.3	23.2	12827.2	122.5	53.8	93.8	35.3	1.1	1.2	106.8	1
10	20	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	Elec		182.5	56.1	19.6	10612.4	101.3	81.2	108.4	28.5	0.9	0.8	105.6	1
10	20	2	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	176.6	47.5	22.8	12552.9	119.9	56.7	100	35.3	1.1	1.2	105.1	1
10	40	2	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	174.6	45.7	22.4	12347.8	117.9	56.7	98.5	37.9	1.2	1.3	105.2	1
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	167.7	30.9	14.7	7759.7	74.1	93.6	133	60.7	1.8	1.7	85.9	2
15	20	1.2	0.3	0.1	30	90	20	FC	Condensing	40	NG	NG	163	31.4	19.6	10718.7	102.3	60.6	104.8	78.4	2.4	2.6	77.7	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	40	Elec	NG	159.1	30	14.5	7701.4	73.5	85.5	117.7	81	2.5	2.3	79.9	2
15	40	1.2	0.3	0.1	30	90	40	FC	Condensing	40	Elec	NG	159.2	31.6	14.9	7889.3	75.3	83.9	111.7	81	2.5	2.3	81.2	2
15	20	1.2	0.4	0.1	30	90	40	FC	Condensing	40	NG	NG	161	31.7	19.7	10768.5	102.8	58.2	106.6	78.4	2.4	2.6	79.7	2
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	167.7	30.9	19.5	10626.6	101.5	66.3	118.1	60.7	1.8	2	86.2	2
15	40	1.2	0.3	0.1	30	90	20	FC	Condensing	40	NG	NG	161	29.7	19.2	10518.2	100.4	60.6	103.3	81	2.5	2.7	77.7	2
15	40	1.2	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	159.2	31.6	19.6	10756.2	102.7	56.5	96.8	81	2.5	2.7	81.6	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	40	NG	NG	159.1	30	19.3	10568.4	100.9	58.2	102.8	81	2.5	2.7	80.3	2
15	20	1.2	0.4	0.1	30	90	40	FC	Condensing	40	Elec	NG	161	31.7	14.9	7901.5	75.4	85.5	121.5	78.4	2.4	2.2	79.3	2
20	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	146.3	27.5	13.7	7301.5	69.7	76.6	111.5	158.8	4.8	5.2	16.1	3
20	40	1.2	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	142.3	27.6	8.9	4442	42.4	99.9	119.8	161.5	4.9	4.5	19.6	3
20	40	1.2	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	144.5	27.3	8.9	4426.4	42.3	102.2	121	161.5	4.9	4.5	16.6	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.9	26.5	8.9	4391.3	41.9	107.9	137.7	129.8	4	3.6	37.6	3
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	149	28	9	4441.3	42.4	106.6	130.3	129.8	4	3.6	40.4	3
20	40	1.2	0.4	0.1	30	90	20	VAV	ASHP	40	NG		142.9	28	14.7	7891.5	75.3	67.6	116.4	161.5	4.9	5.3	16.3	3
20	40	1.2	0.4	0.1	30	90	40	FC	ASHP	40	NG	NG	142.3	27.6	13.7	7308.9	69.8	72.5	105	161.5	4.9	5.2	20	3
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	149	28	13.8	7308.3	69.8	79.2	115.4	129.8	4	4.2	40.8	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	149.9	26.5	13.7	7258.2	69.3	80.6	122.8	129.8	4	4.2	37.9	3
20	40	1.2	0.3	0.1	30	90	20	FC	ASHP	40	NG	NG	144.5	27.3	13.7	7293.3	69.6	74.8	106.1	161.5	4.9	5.2	17	3
15	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	Elec	NG	143.9	18.7	8.4	4129.9	39.4	104.5	130.6	175.4	5.3	4.9	1.1	4
20	40	0.8	0.3	0.01	30	90	40	FC	ASHP	40	Elec	NG	136.3	19.6	8.4	4173.4	39.8	96.4	113.9	207	6.3	5.8	-17	4
15	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	NG	142	19.1	8.5	4149.3	39.6	102.3	122.1	175.4	5.3	4.9	5.6	4
15	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG		142	19.4	14.2	7598.4	72.5	69.5	127	175.4	5.3	5.7	0.9	4
20	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	NG	NG	137.5	18.5	13.1	7003.5	66.9	70.6	97.3	207	6.3	6.7	-17.8	4
20	40	0.8	0.3	0.01	30	90	40	FC	ASHP	40	NG	NG	136.3	19.6	13.2	7040.3	67.2	69.1	99	207	6.3	6.7	-16.7	4
15	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	NG	142	19.1	13.2	7016.3	67	75	107.2	175.4	5.3	5.7	5.9	4
15	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	NG	NG	143.9	18.7	13.2	6996.8	66.8	77.1	115.7	175.4	5.3	5.7	1.5	4
20	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	Elec	NG	137.5	18.5	8.4	4136.6	39.5	98	112.2	207	6.3	5.8	-18.1	4
15	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec		142	19.4	9.4	4731.5	45.2	96.8	141.9	175.4	5.3	4.9	0.6	4

Hotel - Highest NPV - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	193.6	62.2	25.9	14285.8	136.4	57.2	105.1	40.2	1.2	1.2	101.1	1
10	20	2.5	0.4	0.1	30	90	40	VAV	Condensing	40	NG	NG	192.3	63	25.9	14306.3	136.6	55.7	116.3	40.2	1.2	1.2	100.1	1
10	20	2.5	0.3	0.1	30	90	40	FC	Condensing	40	Elec	NG	193.6	62.2	21.1	11418.9	109	84.6	120	40.2	1.2	1.1	100.8	1
10	20	2	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	187	59.2	25.1	13880.1	132.5	54.4	109.4	49.1	1.5	1.5	99.5	1
10	40	2.5	0.3	0.1	30	90	40	FC	Condensing	40	NG	NG	191.3	60.1	25.4	14045.7	134.1	57.2	108.7	43.7	1.3	1.3	99.7	1
10	20	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	193.4	65.2	26.3	14559.3	139	54.4	110.1	40.2	1.2	1.2	100.2	1
10	40	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	191	63.1	25.9	14317.3	136.7	54.3	108.9	43.7	1.3	1.3	99.9	1
10	20	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	Elec	NG	193.4	65.2	21.6	11692.4	111.6	81.8	125	40.2	1.2	1.1	99.9	1
10	40	2.5	0.3	0.1	30	90	40	VAV	Condensing	40	Elec	NG	191	63.1	21.1	11450.3	109.3	81.7	123.8	43.7	1.3	1.2	99.6	1
10	20	2.5	0.4	0.1	30	90	40	VAV	Condensing	40	Elec	NG	192.3	63	21.1	11439.3	109.2	83.1	131.2	40.2	1.2	1.1	99.7	1
15	40	0.8	0.4	0.1	30	90	20	FC	Condensing	40	NG	NG	164.9	30.3	19.5	10646.5	101.7	63.2	125.3	165.2	5	5	6.8	2
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	169	31	14.9	7832.4	74.8	94.2	149.9	150.2	4.6	3.9	13.9	2
15	40	0.8	0.4	0.1	30	90	20	FC	Condensing	40	Elec	NG	164.9	30.3	14.7	7779.6	74.3	90.6	140.2	165.2	5	4.3	6.4	2
15	40	0.8	0.3	0.1	30	90	20	FC	Condensing	40	Elec	NG	164.4	31.6	15	7930.2	75.7	88.7	131.9	165.2	5	4.3	9	2
15	40	0.8	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	166.4	29.9	14.6	7710.3	73.6	92.8	140.3	165.2	5	4.3	4.5	2
15	20	0.8	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	168.6	31.9	19.8	10808.3	103.2	65.4	124.4	161.7	4.9	4.9	5.8	2
15	40	0.8	0.3	0.1	30	90	0	FC	Condensing	40	NG	NG	166.4	29.9	19.4	10577.3	101	65.4	125.4	165.2	5	5	4.8	2
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	169	31	19.6	10699.3	102.2	66.9	135	150.2	4.6	4.5	14.3	2
15	40	0.8	0.3	0.1	30	90	20	FC	Condensing	40	NG	NG	164.4	31.6	19.7	10797.1	103.1	61.3	117	165.2	5	5	9.3	2
15	20	0.8	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	168.6	31.9	15	7941.4	75.8	92.8	139.3	161.7	4.9	4.2	5.5	2
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	148.7	27.7	13.8	7324.3	69.9	78.7	130.3	270.2	8.2	8.1	-79.6	3
30	40	0.8	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	145.6	26.2	8.9	4407.2	42.1	103.6	131.3	394.3	12	10.2	-196.9	3
30	20	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148	27	9	4435.4	42.3	105.7	143.3	390.8	11.9	10.1	-199.2	3
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148.7	27.7	9	4457.4	42.6	106.1	145.2	270.2	8.2	7	-79.9	3
30	40	0.8	0.4	0.1	30	90	40	FC	ASHP	40	NG	NG	143.8	26.7	13.7	7297.9	69.7	74.1	122.5	394.3	12	11.8	-195.6	3
30	40	0.8	0.3	0.1	30	90	20	FC	ASHP	40	NG	NG	145.6	26.2	13.7	7274.1	69.5	76.2	116.4	394.3	12	11.8	-196.5	3
30	20	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	148	27	13.8	7302.4	69.7	78.3	128.5	390.8	11.9	11.7	-198.8	3
30	40	0.8	0.4	0.1	30	90	20	VAV	ASHP	40	NG	NG	144.4	27	14.7	7877.8	75.2	69.2	127.7	394.3	12	11.8	-197.7	3
30	40	0.8	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	143.8	26.7	8.9	4431	42.3	101.4	137.3	394.3	12	10.2	-196	3
30	40	0.8	0.4	0.1	30	90	20	VAV	ASHP	40	Elec	NG	144.4	27	9.9	5010.9	47.8	96.6	142.6	394.3	12	10.2	-198	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	NG	143.6	19.7	13.3	7054	67.4	76.2	129.5	397.4	12.1	11.9	-200.3	4
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	NG	143.9	19.9	14.3	7631.9	72.9	71	135.2	397.4	12.1	11.9	-202	4
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	NG	143.6	19.7	8.5	4187.1	40	103.6	144.4	397.4	12.1	10.3	-200.6	4
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec	NG	143.9	19.9	9.5	4765	45.5	98.4	150	397.4	12.1	10.3	-202.3	4

Hotel - Highest NPV - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
15	20	1.6	0.3	0.1	50	90	20	VAV	Condensing	40	Elec	203.9	69.4	22.5	12200.7	116.5	87.5	136.4	-105.7	-3.2	-2.6	250.3	1
10	20	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	Elec	208.1	76.3	23.9	13005.4	124.2	83.9	139	-111.6	-3.4	-2.8	250.4	1
15	40	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	NG	200.3	69.3	27.3	15077.3	144	56.3	125	-102.2	-3.1	-2.9	250.9	1
15	40	1.6	0.3	0.1	50	90	20	VAV	Condensing	40	NG	201.3	67	26.8	14793.5	141.2	60.1	122.4	-102.2	-3.1	-2.9	250.1	1
15	20	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	NG	202.9	71.7	27.7	15353.6	146.6	56.3	122.1	-105.7	-3.2	-3	251.8	1
10	20	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	NG	208.1	76.3	28.7	15872.4	151.5	56.5	124.1	-111.6	-3.4	-3.2	250.8	1
10	40	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	NG	205.4	73.9	28.2	15596.5	148.9	56.5	126.9	-108.1	-3.3	-3.1	249.9	1
15	20	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	Elec	202.9	71.7	23	12486.7	119.2	83.7	137	-105.7	-3.2	-2.6	251.5	1
15	20	1.6	0.3	0.1	50	90	20	VAV	Condensing	40	NG	203.9	69.4	27.3	15067.6	143.9	60.1	121.5	-105.7	-3.2	-3	250.6	1
15	40	1.6	0.3	0.1	50	90	40	VAV	Condensing	40	Elec	200.3	69.3	22.5	12210.3	116.6	83.7	139.9	-102.2	-3.1	-2.5	250.5	1
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	155.4	31.1	9.3	4583.1	43.8	111.7	163.3	372.2	11.3	9.1	-174.3	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	Elec	164.1	31.1	3.8	1172.3	11.2	152.9	163.3	366.6	11.2	8.9	-179.7	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	NG	155.4	31.1	14.1	7450	71.1	84.3	148.4	372.2	11.3	10.4	-174	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	NG	166.3	31.1	16.1	8587	82	84.3	148.4	366.6	11.2	10.3	-181.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	169.1	31.1	15	7904.1	75.5	93.7	156.5	308.5	9.4	7.6	-125.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	169.1	31.1	19.8	10771	102.8	66.3	141.6	308.5	9.4	8.7	-125.5	2
30	40	0.8	0.3	0.01	30	90	0	VAV	ASHP	40	Elec	148	27.3	10	5032.7	48.1	100	144.7	375.3	11.4	9.2	-163.8	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	Elec	145.3	27.7	9	4480.7	42.8	102.5	145.7	375.3	11.4	9.2	-160.7	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	148.2	25.9	9	4414.6	42.2	106.1	153.5	375.3	11.4	9.2	-166.2	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	Elec	147.1	27	9	4452.4	42.5	104.6	140.4	375.3	11.4	9.2	-161.7	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	NG	145.3	27.7	13.8	7347.6	70.2	75.2	130.8	375.3	11.4	10.5	-160.4	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	148.2	25.9	13.7	7281.5	69.5	78.7	138.6	375.3	11.4	10.5	-165.8	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	NG	147.1	27	13.8	7319.3	69.9	77.2	125.5	375.3	11.4	10.5	-161.3	3
30	40	0.8	0.3	0.01	30	90	0	VAV	ASHP	40	NG	148	27.3	14.8	7899.7	75.4	72.6	129.8	375.3	11.4	10.5	-163.4	3
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	148.7	26.2	14.7	7859.9	75	73.7	138.6	375.3	11.4	10.5	-166.4	3
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec	148.7	26.2	9.9	4992.9	47.7	101	153.4	375.3	11.4	9.2	-166.7	3

Hotel - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	Elec	Elec	157.8	48.2	3.5	1088.3	10.4	147.4	150	1.1	0	0	137.8	1
10	20	2.5	0.4	0.1	30	0	20	VAV	Condensing	20	Elec	Elec	153.3	47.4	3.5	1082.4	10.3	142.9	145.1	1.4	0	0	144.3	1
10	20	2.5	0.4	0.1	30	0	0	VAV	Condensing	20	Elec	Elec	157.2	45.6	3.5	1062.4	10.1	147	153.6	1.4	0	0	137.4	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	NG	Elec	157.8	48.2	8.3	3955.3	37.8	120	135.1	1.1	0	0	138.1	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	Elec	NG	197.6	48.2	20	10752.6	102.7	94.9	143.9	1.1	0	0	90.4	1
10	40	2.5	0.4	0.2	30	0	0	VAV	Condensing	20	NG	NG	197.6	48.2	24.8	13619.6	130	67.6	129	1.1	0	0	90.7	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	Elec	Elec	195.4	48.2	12.5	6204.9	59.2	136.2	143.9	1.1	0	0	92.8	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	NG	NG	197.6	48.2	24.8	13619.6	130	67.6	129	1.1	0	0	90.7	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	Elec	NG	197.6	48.2	20	10752.6	102.7	94.9	143.9	1.1	0	0	90.4	1
10	40	2.5	0.4	0.2	30	0	0	FC	Condensing	20	NG	Elec	195.4	48.2	17.2	9071.8	86.6	108.8	129	1.1	0	0	93.1	1
10	40	2.5	0.4	0.2	30	60	20	VAV	Condensing	20	Elec	Elec	147.3	27.7	3.1	880	8.4	138.9	135	17.5	0.5	0.5	138	2
10	40	2.5	0.4	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	151.3	26.1	3.1	862.6	8.2	143.1	143.5	17.5	0.5	0.5	131.1	2
10	40	2.5	0.3	0.2	30	60	20	VAV	Condensing	20	Elec	Elec	146	29.2	3.1	894.9	8.5	137.5	129.1	17.5	0.5	0.5	141	2
10	40	2.5	0.3	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	149.7	27.5	3.1	876.7	8.4	141.4	131.4	17.5	0.5	0.5	135.9	2
10	20	2.5	0.4	0.2	30	60	20	VAV	Condensing	20	Elec	Elec	147.6	28.5	3.1	889.1	8.5	139.1	139.3	15.1	0.5	0.5	139	2
10	20	2.5	0.4	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	151.6	27	3.1	871.6	8.3	143.3	145.7	15.1	0.5	0.5	132.5	2
10	20	2.5	0.3	0.2	30	60	0	VAV	Condensing	20	Elec	Elec	150	28.4	3.1	885.8	8.5	141.6	135.8	15.1	0.5	0.5	136.8	2
10	40	2.5	0.3	0.2	30	60	20	FC	Condensing	20	Elec	Elec	169.2	29.2	8.6	4042.1	38.6	130.6	125.4	17.5	0.5	0.5	113.4	2
10	40	2.5	0.4	0.2	30	60	20	FC	Condensing	20	Elec	Elec	169.3	27.7	8.3	3875.4	37	132.3	131.4	17.5	0.5	0.5	111.7	2
10	40	2.5	0.4	0.2	30	60	40	VAV	Condensing	20	Elec	Elec	143.8	29.4	3.1	899.4	8.6	135.2	128.1	17.5	0.5	0.5	144.1	2
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	139.2	19.4	2.9	798.7	7.6	131.6	116.7	54.1	1.6	1.6	115.8	3
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.5	19.6	2.9	801.2	7.7	131.8	116.7	55.5	1.7	1.7	114.1	3
15	20	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	138.5	18	2.8	785.6	7.5	131	113.8	65.5	2	2	106	3
15	20	1.6	0.4	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	140	16.9	2.8	774.3	7.4	132.6	124.4	65.5	2	2	101.6	3
10	40	1.6	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	139.2	19.4	7.6	3665.6	35	104.2	101.8	54.1	1.6	1.9	116.2	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	NG	Elec	138.8	19.5	7.6	3666.7	35	103.8	98.6	56.1	1.7	2	115.5	3
10	40	1.2	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.5	19.6	7.6	3668.2	35	104.5	101.8	55.5	1.7	2	114.5	3
15	40	2	0.3	0.1	30	90	40	VAV	Condensing	20	Elec	Elec	138.8	19.5	2.9	799.7	7.6	131.2	113.5	56.1	1.7	1.7	115.1	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	NG	Elec	139.1	19.7	7.6	3669.7	35	104.1	99.7	51.6	1.6	1.8	119.4	3
15	40	1.6	0.3	0.1	30	60	40	VAV	Condensing	20	Elec	Elec	139.1	19.7	2.9	802.8	7.7	131.4	114.6	51.6	1.6	1.5	119	3

Hotel - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	Elec	Elec	206.2	59	14.8	7555.7	72.1	134.1	156.2	3.1	0.1	0.1	113.8	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	208.4	57.2	14.5	7332.5	70	138.4	161.7	3.1	0.1	0.1	109.7	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	209.7	58.3	14.7	7458.2	71.2	138.5	163.6	0.9	0	0	109.9	1
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	NG	Elec	206.2	59	19.6	10422.6	99.5	106.7	141.3	3.1	0.1	0.1	114.2	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	208.4	57.2	19.2	10199.5	97.4	111	146.8	3.1	0.1	0.1	110.1	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	209.7	58.3	19.5	10325.1	98.6	111.1	148.7	0.9	0	0	110.3	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	211.8	58.3	27	14872.9	142	69.8	148.7	0.9	0	0	107.9	1
10	40	2.5	0.4	0.1	30	0	20	FC	Condensing	20	Elec	NG	208.4	59	22.4	12103.5	115.6	92.8	156.2	3.1	0.1	0.1	111.4	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	210.6	57.2	22.1	11880.3	113.4	97.1	161.7	3.1	0.1	0.1	107.3	1
10	20	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	211.8	58.3	22.3	12006	114.6	97.2	163.6	0.9	0	0	107.5	1
15	20	2.5	0.4	0.1	30	60	0	FC	Condensing	40	Elec	NG	168.4	28.7	14.2	7437.2	71	97.4	149.6	31.5	1	0.9	133.9	2
10	40	2	0.4	0.1	30	60	20	FC	Condensing	40	Elec	NG	164.5	28.6	14.2	7438.5	71	93.5	143.8	27.8	0.8	0.8	143.9	2
10	40	2	0.4	0.1	30	60	0	FC	Condensing	40	Elec	NG	167.2	27.2	13.9	7258.4	69.3	97.9	150.8	27.8	0.8	0.8	138.9	2
10	40	2	0.3	0.1	30	60	0	FC	Condensing	40	Elec	NG	166.8	28.6	14.2	7421.5	70.9	95.9	144.8	27.8	0.8	0.8	140.8	2
10	20	2	0.4	0.1	30	60	20	FC	Condensing	40	Elec	NG	165.7	29.7	14.4	7560.9	72.2	93.5	157.5	25.6	0.8	0.7	141.4	2
10	20	2	0.4	0.1	30	60	0	FC	Condensing	40	Elec	NG	168.4	28.2	14.1	7379	70.5	98	151.4	25.6	0.8	0.7	139.4	2
10	20	2	0.3	0.1	30	60	0	FC	Condensing	40	Elec	NG	168	29.6	14.4	7544.1	72	96	146.1	25.6	0.8	0.7	141.2	2
10	20	2	0.4	0.1	30	60	20	FC	Condensing	40	NG	NG	165.7	29.7	19.1	10427.8	99.6	66.1	142.6	25.6	0.8	0.8	141.7	2
10	20	2	0.4	0.1	30	60	0	FC	Condensing	40	NG	NG	168.4	28.2	18.9	10246	97.8	70.6	136.6	25.6	0.8	0.8	139.8	2
10	20	2	0.3	0.1	30	60	0	FC	Condensing	40	NG	NG	168	29.6	19.1	10411	99.4	68.6	131.2	25.6	0.8	0.8	141.6	2
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	Elec	NG	144.9	19.4	12.2	6405	61.2	83.7	117.9	82.9	2.5	2.3	119.3	3
15	40	1.2	0.3	0.1	30	90	40	VAV	Condensing	40	NG	NG	144.9	19.4	17	9271.9	88.5	56.4	103	82.9	2.5	2.7	119.6	3
15	40	1.6	0.4	0.2	30	90	20	FC	ASHP	40	Elec	NG	143.4	20.8	8.5	4177.1	39.9	103.6	137.3	103.9	3.2	2.9	95.3	3
15	40	2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.1	19.9	8.5	4147.8	39.6	103.5	137.8	95.2	2.9	2.7	104.3	3
15	20	1.6	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.8	18.3	8.4	4091.3	39.1	105.7	139.6	104.2	3.2	2.9	92.8	3
15	20	2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.7	20.9	8.5	4184.1	39.9	103.7	147.8	93	2.8	2.6	103.4	3
10	40	1.6	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	143.6	20	8.5	4149.4	39.6	104	140.4	94.8	2.9	2.7	103.4	3
10	20	1.6	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	144.2	21	8.5	4185.5	40	104.3	150.3	92.6	2.8	2.6	102.5	3
10	40	1.6	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	144.1	20.4	9.5	4739.8	45.3	98.8	148.9	94.8	2.9	2.7	100.9	3
15	40	2	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	143.6	20.3	9.4	4737.3	45.2	98.3	143	95.2	2.9	2.7	102.5	3
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	130	12.3	13.6	7349.7	70.2	59.8	103.7	187	5.7	6.1	33.8	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.7	12.1	13.6	7343.9	70.1	59.6	102	263.2	8	8.7	-41.7	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.1	11	13.6	7306.5	69.8	59.4	101.2	265.4	8.1	8.7	-43	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	130	12.3	8.9	4482.7	42.8	87.2	118.5	187	5.7	5.3	33.5	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.7	12.1	8.9	4477	42.7	87	116.9	263.2	8	7.4	-42.1	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.1	11	8.8	4439.6	42.4	86.7	116.1	265.4	8.1	7.5	-43.3	4

Hotel - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	Elec	231.4	82	24.3	13070.3	124.8	106.6	131.9	6	0.2	0.2	91.3	1
10	20	2	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	227.5	78.3	18.8	9792.7	93.5	134	147	10.1	0.3	0.3	91.5	1
10	20	2	0.4	0.1	30	0	20	FC	Condensing	20	Elec	Elec	226.1	80.6	19.2	10077.1	96.2	129.9	140	10.1	0.3	0.3	95	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	Elec	231.4	82	19.5	10203.3	97.4	133.9	146.8	6	0.2	0.1	90.9	1
10	20	2	0.3	0.1	30	0	0	FC	Condensing	20	Elec	Elec	229.5	81.2	19.3	10124.6	96.7	132.8	136.6	10.1	0.3	0.3	91.6	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	233.5	82	27.1	14751.1	140.8	92.7	146.8	6	0.2	0.2	88.5	1
10	20	2	0.4	0.1	30	0	20	FC	Condensing	20	Elec	NG	228.3	80.6	26.8	14624.8	139.6	88.6	140	10.1	0.3	0.3	92.5	1
10	20	2	0.4	0.1	30	0	0	FC	Condensing	20	Elec	NG	229.7	78.3	26.4	14340.5	136.9	92.8	147	10.1	0.3	0.3	89.1	1
10	20	2	0.3	0.1	30	0	0	FC	Condensing	20	Elec	NG	231.7	81.2	26.9	14672.4	140.1	91.6	136.6	10.1	0.3	0.3	89.1	1
10	40	2.5	0.4	0.1	30	0	0	FC	Condensing	20	NG	NG	233.5	82	31.8	17618.1	168.2	65.3	131.9	6	0.2	0.2	88.8	1
15	40	2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	162.2	26.9	13.8	7261.1	69.3	92.9	134.7	66.7	2	1.7	118.7	2
15	40	2	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	162.4	28.6	14.2	7442.9	71.1	91.3	127.6	66.7	2	1.7	120.2	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	20	Elec	Elec	168.9	28.7	8.6	4070.3	38.9	130	124.7	62.5	1.9	1.5	116.9	2
10	40	1.6	0.4	0.1	30	90	20	FC	Condensing	20	Elec	Elec	169.4	28.8	8.6	4080.8	39	130.4	129.6	63.9	1.9	1.6	113.7	2
15	20	2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	163.8	28.3	14.1	7427.4	70.9	92.9	135.8	64.1	2	1.6	119.2	2
10	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	162.7	27	13.9	7272.9	69.4	93.3	141.9	68.1	2.1	1.7	114.9	2
10	40	1.6	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	162.8	28.6	14.2	7448.8	71.1	91.7	132	68.1	2.1	1.7	117.2	2
10	20	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	164.3	28.4	14.2	7438.7	71	93.3	138.8	65.5	2	1.6	116.4	2
15	40	2	0.4	0.1	30	90	20	FC	Condensing	40	Elec	NG	160.2	28.7	14.2	7481.1	71.4	88.7	124.7	66.7	2	1.7	123.6	2
15	40	2	0.4	0.1	30	90	0	VAV	Condensing	40	Elec	NG	160.5	29.1	14.2	7482.5	71.4	89.1	135.9	66.7	2	1.7	120.5	2
15	20	1.2	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	138.3	24.7	8.7	4332.8	41.4	97	124.8	146.7	4.5	3.6	70.5	3
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.7	24.9	8.8	4323.2	41.3	103.4	132.3	129.1	3.9	3.2	78.5	3
15	20	1.2	0.3	0.1	30	90	0	VAV	ASHP	40	Elec	NG	141.1	24.7	9.7	4899.5	46.8	94.3	134.9	146.7	4.5	3.6	64.7	3
15	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	141.5	23	8.6	4266.5	40.7	100.8	133.6	146.7	4.5	3.6	64.5	3
15	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.8	21.4	8.6	4206.2	40.2	104.6	141.7	146.7	4.5	3.6	58.5	3
15	20	1.2	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	140.6	24.4	8.7	4314	41.2	99.4	122.5	146.7	4.5	3.6	68.3	3
15	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	143.8	22.7	8.6	4250.4	40.6	103.2	133.1	146.7	4.5	3.6	61.8	3
15	40	1.6	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	144.7	24.9	13.5	7190.1	68.7	76.1	117.4	129.1	3.9	3.6	78.9	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	144	20	8.5	4157.9	39.7	104.3	142.2	149.4	4.6	3.7	56.7	3
15	20	1.2	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	141.7	23.3	9.6	4852	46.3	95.3	140.7	146.7	4.5	3.6	62.6	3
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	128.7	15.3	9.1	4599.1	43.9	84.7	107.9	321.6	9.8	7.9	-88.2	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.8	17.2	13.9	7528.4	71.9	57.9	93.1	226.6	6.9	6.4	5.7	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	16.8	13.9	7516.5	71.8	57.7	96.3	318.9	9.7	9	-87	4
30	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	NG	NG	128.7	15.3	13.8	7466	71.3	57.4	93	321.6	9.8	9.1	-87.9	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	NG	NG	129.5	14.3	13.8	7431	71	58.5	103.4	321.6	9.8	9.1	-91.4	4
20	40	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.8	17.2	9.2	4661.5	44.5	85.2	108	226.6	6.9	5.6	5.3	4
30	20	0.8	0.3	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	16.8	9.1	4649.6	44.4	85.1	111.2	318.9	9.7	7.9	-87.4	4
30	40	0.8	0.4	0.01	30	90	40	VAV	ASHP	40	Elec	NG	129.5	14.3	9	4564.1	43.6	85.9	118.3	321.6	9.8	7.9	-91.7	4

Hotel - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	Elec	216.4	67.3	16.6	8534.5	81.5	135	137.4	2.4	0.1	0.1	82.6	1
10	20	2.5	0.4	0.1	30	60	0	FC	Condensing	20	Elec	Elec	209.7	61	15.3	7818.4	74.6	135	141.4	5.4	0.2	0.2	87	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	NG	218.6	67.3	28.9	15949.2	152.3	66.3	122.6	2.4	0.1	0.1	80.6	1
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	Elec	214.5	65.6	16.2	8331.9	79.6	134.9	138.9	5.1	0.2	0.1	82	1
10	20	2.5	0.3	0.1	30	60	20	FC	Condensing	20	Elec	Elec	209	65.4	16.1	8329.6	79.5	129.5	121.3	5.4	0.2	0.2	92.7	1
10	20	2.5	0.4	0.1	30	60	20	FC	Condensing	20	Elec	Elec	208	63.1	15.7	8065.7	77	130.9	136.7	5.4	0.2	0.2	90.3	1
10	20	2.5	0.3	0.1	30	60	0	FC	Condensing	20	Elec	Elec	210.6	63.3	15.7	8071.7	77.1	133.5	128.4	5.4	0.2	0.2	89	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	Elec	216.4	67.3	21.3	11401.5	108.9	107.6	122.6	2.4	0.1	0.1	83	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	218.6	67.3	24.1	13082.3	124.9	93.7	137.4	2.4	0.1	0.1	80.2	1
10	40	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	216.7	65.6	23.8	12879.6	123	93.7	138.9	5.1	0.2	0.1	79.6	1
15	40	1.2	0.3	0.1	30	90	40	FC	Condensing	20	Elec	Elec	167.9	31.6	9.3	4478.5	42.8	125.1	111.7	76.8	2.3	2.1	74.5	2
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	167.7	30.9	19.5	10626.6	101.5	66.3	118.1	60.7	1.8	2	86.2	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	20	Elec	NG	169.9	30	16.6	8838.4	84.4	85.5	117.7	76.8	2.3	2.2	70.8	2
10	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	168.1	30.8	14.7	7753.5	74	94.1	135.4	71.9	2.2	2	73.6	2
15	40	1.6	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	167.7	30.9	14.7	7759.7	74.1	93.6	133	60.7	1.8	1.7	85.9	2
15	40	1.2	0.4	0.2	30	90	0	FC	Condensing	40	Elec	NG	168.9	32	15	7882.6	75.3	93.6	138	78	2.4	2.2	65.9	2
15	40	1.2	0.4	0.1	30	90	40	FC	Condensing	20	Elec	Elec	167.8	30	9	4290.6	41	126.8	117.7	76.8	2.3	2.1	73.2	2
15	40	1.2	0.4	0.1	30	90	20	FC	Condensing	20	Elec	Elec	169.8	28.2	8.6	4063.4	38.8	131	124.1	76.8	2.3	2.1	69.2	2
15	20	1.2	0.4	0.1	30	90	40	FC	Condensing	20	Elec	Elec	169.7	31.7	9.3	4490.7	42.9	126.8	121.5	74.1	2.3	2.1	72.6	2
15	40	1.2	0.3	0.1	30	90	20	FC	Condensing	20	Elec	Elec	169.7	29.7	8.9	4240.5	40.5	129.2	118.2	76.8	2.3	2.1	70.6	2
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	149	28	13.8	7308.3	69.8	79.2	115.4	129.8	4	4.2	40.8	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	149.9	26.5	13.7	7258.2	69.3	80.6	122.8	129.8	4	4.2	37.9	3
20	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	147.4	25.6	8.9	4362.1	41.6	105.8	128	161.5	4.9	4.5	11.3	3
15	40	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	149	28	9	4441.3	42.4	106.6	130.3	129.8	4	3.6	40.4	3
15	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.9	26.5	8.9	4391.3	41.9	107.9	137.7	129.8	4	3.6	37.6	3
20	20	1.2	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	148.5	27.3	9	4421.3	42.2	106.3	128.7	158.8	4.8	4.4	12.4	3
20	20	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.4	25.9	8.9	4372.7	41.8	107.7	134.8	158.8	4.8	4.4	9.9	3
20	20	1.2	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	146.6	27.9	9.9	5017.8	47.9	98.7	139.3	158.8	4.8	4.4	12.1	3
20	40	1.2	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	148.3	24.2	8.8	4314.4	41.2	107.2	136.2	161.5	4.9	4.5	8.2	3
20	20	1.2	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	146.3	27.5	9	4434.6	42.3	104	126.3	158.8	4.8	4.4	15.7	3
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	NG	NG	144.7	17.7	13.2	6962.8	66.5	78.2	114.6	299.6	9.1	9.7	-123.4	4
30	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	141.5	19.1	13.2	7016.7	67	74.5	113.4	299.6	9.1	9.7	-119.1	4
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	NG	NG	143.4	18.8	13.2	6998.9	66.8	76.6	112.5	299.6	9.1	9.7	-121.4	4
30	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	141.5	19.1	8.5	4149.8	39.6	101.8	128.3	299.6	9.1	8.4	-119.5	4
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	144.7	17.7	8.4	4095.8	39.1	105.5	129.5	299.6	9.1	8.4	-123.8	4
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	143.4	18.8	8.4	4132	39.5	104	127.4	299.6	9.1	8.4	-121.8	4
30	40	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	NG	NG	141.6	19.4	14.2	7598.8	72.6	69	124.7	299.6	9.1	9.8	-122.2	4
30	40	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	141.6	19.4	9.4	4731.9	45.2	96.4	139.6	299.6	9.1	8.4	-122.5	4
15	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	NG	142	19.4	14.2	7598.4	72.5	69.5	127	175.4	5.3	5.7	0.9	4
20	20	0.8	0.3	0.01	30	90	20	FC	ASHP	40	Elec	NG	140.4	19.7	8.5	4171.6	39.8	100.5	121.7	204.3	6.2	5.7	-21.3	4

Hotel - Lowest Cost of GHG Abatement - CZ7b

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	NG	236.7	82.6	32.1	17775.1	169.7	66.9	131.2	6.2	0.2	0.2	75.7	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	Elec	Elec	232.7	84.8	20.2	10616.4	101.4	131.3	139.7	6.2	0.2	0.2	81.5	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	Elec	234.5	82.6	19.8	10360.4	98.9	135.6	146.1	6.2	0.2	0.2	77.7	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	Elec	Elec	235.5	85.1	20.3	10632.8	101.5	134	137.5	6.2	0.2	0.2	78.6	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	NG	Elec	232.7	84.8	25	13483.4	128.7	104	124.9	6.2	0.2	0.2	81.8	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	NG	Elec	234.5	82.6	24.6	13227.3	126.3	108.2	131.2	6.2	0.2	0.2	78.1	1
10	20	2.5	0.4	0.2	30	60	20	FC	Condensing	20	Elec	NG	234.9	84.8	27.8	15164.2	144.8	90.1	139.7	6.2	0.2	0.2	79.1	1
10	20	2.5	0.4	0.2	30	60	0	FC	Condensing	20	Elec	NG	236.7	82.6	27.4	14908.2	142.3	94.3	146.1	6.2	0.2	0.2	75.3	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	Elec	NG	237.7	85.1	27.8	15180.6	144.9	92.7	137.5	6.2	0.2	0.2	76.2	1
10	20	2.5	0.3	0.2	30	60	0	FC	Condensing	20	NG	Elec	235.5	85.1	25	13499.8	128.9	106.6	122.7	6.2	0.2	0.2	78.9	1
15	20	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	169.1	30.6	19.6	10663.8	101.8	67.3	135.6	161.7	4.9	4.9	2.5	2
15	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	166.9	28.6	14.4	7569	72.3	94.7	150.8	165.2	5	4.3	1.3	2
15	40	0.8	0.3	0.1	30	90	20	FC	Condensing	40	Elec	NG	164.4	31.6	15	7930.2	75.7	88.7	131.9	165.2	5	4.3	9	2
15	20	0.8	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	168.6	31.9	15	7941.4	75.8	92.8	139.3	161.7	4.9	4.2	5.5	2
15	20	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	169.1	30.6	14.8	7796.9	74.4	94.6	150.5	161.7	4.9	4.2	2.2	2
15	40	0.8	0.3	0.1	30	90	0	FC	Condensing	40	Elec	NG	166.4	29.9	14.6	7710.3	73.6	92.8	140.3	165.2	5	4.3	4.5	2
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	Elec	NG	169	31	14.9	7832.4	74.8	94.2	149.9	150.2	4.6	3.9	13.9	2
15	40	0.8	0.4	0.1	30	90	20	FC	Condensing	40	Elec	NG	164.9	30.3	14.7	7779.6	74.3	90.6	140.2	165.2	5	4.3	6.4	2
20	40	1.2	0.4	0.1	30	90	0	FC	Condensing	40	NG	NG	169	31	19.6	10699.3	102.2	66.9	135	150.2	4.6	4.5	14.3	2
15	40	0.8	0.4	0.1	30	90	0	VAV	Condensing	40	Elec	NG	165.1	30.7	14.7	7762.7	74.1	91	149.7	165.2	5	4.3	3.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.6	23.4	8.8	4307.5	41.1	108.5	149	394.3	12	10.2	-206.1	3
30	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	146.7	25	8.9	4367	41.7	105	142.8	394.3	12	10.2	-201	3
30	40	0.8	0.3	0.1	30	90	20	FC	ASHP	40	Elec	NG	145.6	26.2	8.9	4407.2	42.1	103.6	131.3	394.3	12	10.2	-196.9	3
30	40	0.8	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	148.5	24.5	8.9	4344.9	41.5	107	139.9	394.3	12	10.2	-202.5	3
30	20	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148	27	9	4435.4	42.3	105.7	143.3	390.8	11.9	10.1	-199.2	3
30	20	0.8	0.3	0.1	30	90	0	FC	ASHP	40	Elec	NG	149.8	26.5	9	4413.7	42.1	107.6	141.1	390.8	11.9	10.1	-200.9	3
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	Elec	NG	148.7	27.7	9	4457.4	42.6	106.1	145.2	270.2	8.2	7	-79.9	3
20	40	0.8	0.4	0.1	30	90	20	FC	ASHP	40	NG	NG	148.7	27.7	13.8	7324.3	69.9	78.7	130.3	270.2	8.2	8.1	-79.6	3
30	40	0.8	0.4	0.1	30	90	40	FC	ASHP	40	Elec	NG	143.8	26.7	8.9	4431	42.3	101.4	137.3	394.3	12	10.2	-196	3
30	20	0.8	0.4	0.1	30	90	0	VAV	ASHP	40	Elec	NG	148.4	27.3	10	5015.6	47.9	100.5	151.2	390.8	11.9	10.2	-201.5	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	NG	143.6	19.7	13.3	7054	67.4	76.2	129.5	397.4	12.1	11.9	-200.3	4
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	NG	143.6	19.7	8.5	4187.1	40	103.6	144.4	397.4	12.1	10.3	-200.6	4
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	NG	NG	143.9	19.9	14.3	7631.9	72.9	71	135.2	397.4	12.1	11.9	-202	4
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec	NG	143.9	19.9	9.5	4765	45.5	98.4	150	397.4	12.1	10.3	-202.3	4

Hotel - Lowest Cost of GHG Abatement - CZ8

Wall R	Roof R	Window USI	SHGC	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	Laundry Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.4	0.2	50	60	40	FC	Condensing	20	NG	253.4	103.1	28.9	15738.1	150.3	103.1	151.5	-145.6	-4.4	-4.2	222	1
10	20	1.6	0.4	0.2	50	60	20	FC	Condensing	20	NG	254.9	100.8	28.5	15444.8	147.5	107.4	160.8	-145.6	-4.4	-4.2	217.9	1
10	20	1.6	0.4	0.2	50	60	0	FC	Condensing	20	NG	256.6	98.6	28	15171.6	144.9	111.8	174.6	-145.6	-4.4	-4.2	212.4	1
10	20	1.6	0.3	0.2	50	60	0	FC	Condensing	20	NG	259.8	102.2	36.3	20129.2	192.2	67.6	147.9	-145.6	-4.4	-4.2	215.1	1
10	40	1.6	0.4	0.2	50	60	40	FC	Condensing	20	NG	252.9	100.8	36	20011.4	191.1	61.8	156.1	-142.1	-4.3	-4.1	218.2	1
10	40	1.6	0.3	0.2	50	60	20	FC	Condensing	20	NG	255.7	102.1	36.3	20135.7	192.3	63.4	149.9	-142.1	-4.3	-4.1	216.3	1
10	20	1.6	0.4	0.2	50	60	40	FC	Condensing	20	NG	255.5	103.1	36.5	20285.9	193.7	61.8	151.5	-145.6	-4.4	-4.2	219.6	1
10	20	1.6	0.4	0.2	50	60	20	FC	Condensing	20	NG	257	100.8	36	19992.6	190.9	66.1	160.8	-145.6	-4.4	-4.2	215.5	1
10	20	1.6	0.4	0.2	50	60	0	FC	Condensing	20	NG	258.8	98.6	35.6	19719.4	188.3	70.5	174.6	-145.6	-4.4	-4.2	210	1
10	20	1.6	0.3	0.2	50	60	0	FC	Condensing	20	NG	257.7	102.2	28.7	15581.4	148.8	108.9	147.9	-145.6	-4.4	-4.2	217.5	1
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	Elec	164.1	31.1	3.8	1172.3	11.2	152.9	163.3	366.6	11.2	8.9	-179.7	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	NG	155.4	31.1	14.1	7450	71.1	84.3	148.4	372.2	11.3	10.4	-174	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	20	NG	166.3	31.1	16.1	8587	82	84.3	148.4	366.6	11.2	10.3	-181.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	Elec	169.1	31.1	15	7904.1	75.5	93.7	156.5	308.5	9.4	7.6	-125.8	2
30	40	0.8	0.4	0.1	30	90	0	FC	Condensing	40	NG	169.1	31.1	19.8	10771	102.8	66.3	141.6	308.5	9.4	8.7	-125.5	2
30	40	0.8	0.4	0.1	30	90	0	FC	ASHP	40	Elec	155.4	31.1	9.3	4583.1	43.8	111.7	163.3	372.2	11.3	9.1	-174.3	2
30	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	Elec	149.9	25.3	8.9	4387.8	41.9	108	150	375.3	11.4	9.2	-167.5	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	Elec	148.2	25.9	9	4414.6	42.2	106.1	153.5	375.3	11.4	9.2	-166.2	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	Elec	147.1	27	9	4452.4	42.5	104.6	140.4	375.3	11.4	9.2	-161.7	3
30	40	0.8	0.3	0.01	30	90	0	VAV	ASHP	40	Elec	148	27.3	10	5032.7	48.1	100	144.7	375.3	11.4	9.2	-163.8	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	NG	145.3	27.7	13.8	7347.6	70.2	75.2	130.8	375.3	11.4	10.5	-160.4	3
30	40	0.8	0.4	0.01	30	90	20	FC	ASHP	40	NG	148.2	25.9	13.7	7281.5	69.5	78.7	138.6	375.3	11.4	10.5	-165.8	3
30	40	0.8	0.3	0.01	30	90	20	FC	ASHP	40	NG	147.1	27	13.8	7319.3	69.9	77.2	125.5	375.3	11.4	10.5	-161.3	3
30	40	0.8	0.3	0.01	30	90	0	FC	ASHP	40	NG	149.9	25.3	13.7	7254.8	69.3	80.7	135.1	375.3	11.4	10.5	-167.1	3
30	40	0.8	0.4	0.01	30	90	40	FC	ASHP	40	Elec	145.3	27.7	9	4480.7	42.8	102.5	145.7	375.3	11.4	9.2	-160.7	3
30	40	0.8	0.4	0.01	30	90	0	VAV	ASHP	40	Elec	148.7	26.2	9.9	4992.9	47.7	101	153.4	375.3	11.4	9.2	-166.7	3

Big Box Retail - Lowest ICC - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.2	5	60	0	FC	Condensing	20	NG	114.3	31.4	7	31456.3	32.9	81.3	116.6	-202.1	-8.9	-41861.8	216.5	1
4	20	2.5	0.2	5	60	0.25	FC	Condensing	20	NG	106.9	36.8	7.9	35769.9	38.9	68	101.2	-202.1	-8.9	-25939.8	223.3	1
7	20	2.5	0.2	5	60	0.25	FC	Condensing	20	NG	99.2	30.3	6.7	30249.7	32.3	66.8	97.7	-202.1	-8.9	-25091.2	224.5	1
4	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	99.6	43	8.9	40043.9	44.8	54.7	86.9	-202.1	-8.9	-18822.4	230.1	1
7	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	92	36.4	7.7	34671.9	38.4	53.5	82.4	-202.1	-8.9	-18355.9	231.3	1
10	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	88.5	33.3	7.1	32126.3	35.4	53.1	80.5	-202.1	-8.9	-18192.9	231.7	1
4	20	2.5	0.2	5	60	0	FC	Condensing	20	Elec	114.1	31.4	6.5	29319.3	30.2	83.9	116.6	-202.1	-8.9	-47507.3	215.3	1
4	20	2.5	0.2	5	60	0.25	FC	Condensing	20	Elec	106.8	36.8	7.5	33632.9	36.2	70.6	101.2	-202.1	-8.9	-28001.7	222.1	1
4	20	2.5	0.2	5	60	0.5	RTU	RTU	20	20	118.9	34.5	10.7	48152.8	53.9	64.9	96.7	-205.4	-9.1	-24820	226.7	1
4	20	2	0.2	5	60	0.5	RTU	RTU	20	20	118.2	34.1	10.6	47584.8	53.3	65	96.7	-202.8	-9	-24509.4	224	1
7	20	2.5	0.2	5	60	0.25	RTU	RTU	20	20	113.9	22.9	7.6	34321.5	36.6	77.3	108.6	-205.4	-9.1	-37114.8	221.3	2
4	20	2	0.2	5	60	0.25	RTU	RTU	20	20	123.8	27.2	8.9	39896.3	43.1	80.7	116	-202.8	-9	-42346.9	216.2	2
4	20	2.5	0.2	5	60	0.25	RTU	RTU	20	20	124.4	27.7	9	40431.9	43.7	80.6	116	-205.4	-9.1	-42893.5	218.9	2
7	20	2.5	0.2	5	60	0	RTU	RTU	20	20	121.5	18	6.5	29104.6	29.5	92	126.4	-205.4	-9.1	-90662.8	213.7	2
7	20	2	0.2	5	60	0	RTU	RTU	20	20	120.9	17.6	6.3	28584.7	28.8	92	126.4	-202.8	-9	-89679.6	211.1	2
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20	20	103.5	27.3	8.7	38993	43.2	60.3	86.3	-205.4	-9.1	-22068.7	230	2
4	20	2	0.2	5	60	0	RTU	RTU	20	20	131.2	22.3	7.7	34596.6	35.9	95.3	133.8	-202.8	-9	-132666.7	208.7	2
4	20	2.5	0.2	5	60	0	RTU	RTU	20	20	131.8	22.8	7.8	35106.8	36.5	95.3	133.9	-205.4	-9.1	-134244.7	211.4	2
7	20	2.5	0.2	5	60	0.5	RTU	RTU	20	20	108.4	29.6	9.3	41927.4	46.7	61.7	89.5	-205.4	-9.1	-22828.1	229	2
10	20	2.5	0.2	5	60	0.25	RTU	RTU	20	20	109.1	20.6	7	31431.6	33.2	75.9	105.4	-205.4	-9.1	-35148.5	222.3	2
10	20	1.6	0.2	5	60	0.25	RTU	RTU	20	20	107.9	19.8	6.8	30426.5	32	75.9	105.4	-197.4	-8.7	-33817.1	214.3	3
10	20	2.5	0.1	5	60	0.25	RTU	RTU	20	20	104.7	17.5	6.1	27641.6	28.7	76.1	105.2	-199.9	-8.8	-34430.2	217	3
10	20	2.5	0.1	5	60	0	RTU	RTU	20	20	112.8	12.6	5	22402.8	21.5	91.4	123.7	-199.9	-8.8	-82952.3	209.2	3
10	20	1.6	0.2	5	60	0	RTU	RTU	20	20	115.8	15	5.6	25290.7	25	90.8	123.4	-197.4	-8.7	-77883.3	206.7	3
10	20	2	0.2	5	60	0	RTU	RTU	20	20	116.2	15.4	5.7	25731.4	25.5	90.8	123.4	-202.8	-9	-79646.5	212	3
10	20	2.5	0.2	5	60	0	RTU	RTU	40	40	116.2	15.8	5.7	25715.3	25.5	90.7	123.3	-201.7	-8.9	-78735.4	211.1	3
10	20	2.5	0.2	5	60	0	RTU	RTU	20	20	116.8	15.8	5.8	26281.6	26.2	90.7	123.3	-205.4	-9.1	-80185.1	214.7	3
7	20	2.5	0.1	5	60	0	RTU	RTU	20	20	117.3	15	5.6	25399.9	25	92.3	126.3	-199.9	-8.8	-90979.8	208.4	3
7	20	2.5	0.1	5	60	0.25	RTU	RTU	20	20	109.5	19.8	6.8	30517.9	32	77.4	108.3	-199.9	-8.8	-36305.1	216	3
10	20	2	0.2	5	60	0	RTU	RTU	40	40	115.6	15.4	5.6	25165.1	24.8	90.8	123.4	-199	-8.8	-78187.5	208.4	3

Big Box Retail - Lowest ICC - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.1	5	60	0.5	RTU	RTU	20		127.4	36.9	11.1	50013.4	55.8	71.6	133.8	-224.1	-9.9	-23550.9	246.4	1
7	20	2.5	0.2	5	60	0.5	RTU	RTU	40		132.4	40.5	12	53909.4	60.4	72	134.2	-225.9	-10	-23960.1	247.6	1
7	20	2	0.2	5	60	0.5	RTU	RTU	20		132.4	40	12	53892	60.4	71.9	134.1	-226.8	-10	-24034.5	248.6	1
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20		127	37.9	11.4	51176.1	57.3	69.7	132.4	-229.4	-10.2	-23086.3	252.6	1
10	20	2.5	0.1	5	60	0.5	RTU	RTU	20		121.2	34.3	10.4	46702.8	51.9	69.3	132	-224.1	-9.9	-22359.1	247.9	1
10	20	2.5	0.2	5	60	0.5	RTU	RTU	40		126.3	37.9	11.2	50609.9	56.6	69.7	132.4	-225.9	-10	-22731.2	249.1	1
10	20	2	0.2	5	60	0.5	RTU	RTU	20		126.2	37.5	11.2	50576.8	56.6	69.7	132.4	-226.8	-10	-22809.2	250.1	1
10	20	2.5	0.2	5	60	0.25	RTU	RTU	40		132.1	31.8	9.7	43719.1	47.5	84.6	146.1	-225.9	-10	-34108.1	241.6	1
10	20	2	0.2	5	60	0.25	RTU	RTU	40		131.3	31.3	9.6	43143.5	46.8	84.6	146.1	-223.3	-9.9	-33666.2	239.2	1
10	20	2	0.2	5	60	0.25	RTU	RTU	20		132	31.3	9.7	43709.8	47.4	84.6	146.1	-226.8	-10	-34198.2	242.6	1
20	20	2.5	0.2	5	60	0	RTU	RTU	40		131.3	22.6	7.3	32952.6	33.8	97.6	158.4	-210.2	-9.3	-56159.8	219.9	2
20	20	2	0.2	5	60	0	RTU	RTU	40		130.6	22.1	7.2	32356.5	33	97.6	158.5	-207.6	-9.2	-55544	217.4	2
10	20	1.6	0.1	5	60	0.25	RTU	RTU	40		125.3	27.3	8.5	38170.9	40.8	84.5	146	-212.9	-9.4	-31984.4	229.3	2
20	20	2	0.2	5	60	0	FC	Condensing	20	NG	114.8	29.8	6.7	30009.1	31	83.7	144.6	-208	-9.2	-30504.6	225.5	2
10	20	1.2	0.1	5	60	0.25	RTU	RTU	20		125.3	26.9	8.5	38226.3	40.9	84.5	146	-208.8	-9.2	-31358.6	225.2	2
10	20	1.6	0.1	5	60	0.25	RTU	RTU	20		125.9	27.3	8.6	38737.2	41.5	84.5	146	-216.4	-9.6	-32514.5	232.8	2
20	20	2	0.2	5	60	0	RTU	RTU	20		131.3	22.1	7.3	32922.8	33.7	97.6	158.5	-211.2	-9.3	-56487.9	220.9	2
20	20	2.5	0.1	5	60	0	RTU	RTU	20		127.1	18.7	6.4	28827.9	28.8	98.4	159	-208.4	-9.2	-58510.7	218.1	2
20	20	2.5	0.2	5	60	0	RTU	RTU	20		132	22.6	7.4	33518.8	34.4	97.6	158.4	-213.7	-9.5	-57102.6	223.4	2
20	20	2	0.2	5	60	0	FC	Condensing	20	Elec	114.7	29.8	6.2	27872	28.3	86.3	144.6	-208	-9.2	-33307.2	224.3	2
20	20	2.5	0.1	5	60	0.25	RTU	RTU	20		119.5	24.3	7.8	34981.8	37.1	82.4	144.4	-208.4	-9.2	-29264.2	226.3	3
10	40	2	0.2	5	60	0.25	RTU	RTU	20		118.7	22.8	7.4	33123.1	34.8	83.9	145.7	-204.7	-9.1	-30179.1	221.8	3
10	40	2.5	0.2	5	60	0.25	RTU	RTU	20		119.4	23.2	7.5	33699.2	35.5	83.9	145.8	-207.3	-9.2	-30577.2	224.3	3
7	40	2.5	0.1	5	60	0.25	RTU	RTU	20		120.1	22.4	7.3	32748	34.2	85.9	147.3	-202	-8.9	-31918.7	218.1	3
10	40	2.5	0.1	5	60	0	RTU	RTU	20		123	15.1	5.4	24411.3	23.4	99.6	160	-202	-8.9	-61334.7	211.4	3
10	40	2.5	0.2	5	60	0.25	RTU	RTU	40		118.7	23.2	7.4	33132.9	34.8	83.9	145.8	-203.7	-9	-30056.6	220.9	3
20	20	2.5	0.1	5	60	0.25	RTU	RTU	40		118.8	24.3	7.6	34415.6	36.4	82.4	144.4	-204.9	-9.1	-28768.9	222.8	3
20	20	2	0.1	5	60	0.25	RTU	RTU	40		118.1	23.8	7.5	33789.4	35.7	82.4	144.5	-202.4	-9	-28480.3	220.2	3
20	20	2	0.1	5	60	0.25	RTU	RTU	20		118.8	23.8	7.6	34355.6	36.3	82.4	144.5	-205.9	-9.1	-28976.9	223.7	3
10	40	2.5	0.1	5	60	0.25	RTU	RTU	20		114.1	19.7	6.5	29282	30.2	83.9	145.7	-202	-8.9	-29817.3	219.5	3

Big Box Retail - Lowest ICC - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	1.6	0.2	5	60	0	FC	Condensing	20	Elec	127	47.6	8.7	39061.3	41.8	85.2	215.9	-268.7	-11.9	-45109.7	284.5	1
20	20	1.6	0.2	5	60	0	FC	Condensing	20	NG	127	47.6	9.1	41191.6	44.5	82.5	215.9	-268.7	-11.9	-40956.5	285.8	1
20	20	2.5	0.2	5	60	0	FC	Condensing	40	Elec	127.7	48.9	8.9	40132.1	43.2	84.5	216	-273.7	-12.1	-44798.5	289.8	1
20	20	2.5	0.2	5	60	0	FC	Condensing	20	NG	128.3	48.9	9.4	42296.1	45.9	82.5	216	-277.9	-12.3	-42357.1	294.9	1
20	20	2	0.2	5	60	0	FC	Condensing	40	Elec	127	48.2	8.8	39551.6	42.5	84.5	216	-270.6	-12	-44301.5	286.7	1
20	20	2.5	0.2	5	60	0	FC	Condensing	40	NG	127.7	48.9	9.3	41729.8	45.2	82.5	216	-273.7	-12.1	-41706.1	290.7	1
20	20	2.5	0.2	5	60	0	FC	Condensing	20	Elec	128.3	48.9	8.9	40165.8	43.2	85.2	216	-277.9	-12.3	-46650.7	293.7	1
20	20	2	0.2	5	60	0	FC	Condensing	40	NG	127	48.2	9.1	41149.3	44.5	82.5	216	-270.6	-12	-41242.8	287.7	1
20	20	2	0.2	5	60	0	FC	Condensing	20	NG	127.6	48.2	9.3	41715.6	45.2	82.5	216	-274.8	-12.2	-41893.9	291.9	1
20	20	2	0.2	5	60	0	FC	Condensing	20	Elec	127.6	48.2	8.8	39585.3	42.5	85.2	216	-274.8	-12.2	-46141.5	290.6	1
20	20	2	0.1	5	60	0	FC	Condensing	20	Elec	123.1	43.1	7.9	35714.2	37.8	85.3	215.7	-268.5	-11.9	-45265.5	284.5	2
10	40	2.5	0.2	5	60	0	FC	Condensing	20	Elec	122.9	42.9	7.7	34818.7	36.7	86.2	214.7	-265	-11.7	-46251.3	280.6	2
20	20	2.5	0.1	5	60	0	FC	Condensing	40	Elec	123.1	43.8	8	36235.8	38.5	84.6	215.7	-267.3	-11.8	-43915.3	283.7	2
20	20	2.5	0.1	5	60	0	FC	Condensing	20	Elec	123.8	43.8	8.1	36269.4	38.5	85.3	215.7	-271.6	-12	-45752	287.6	2
20	20	2.5	0.1	5	60	0	FC	Condensing	40	NG	123.1	43.8	8.4	37833.5	40.5	82.6	215.7	-267.3	-11.8	-40873.4	284.6	2
20	20	2	0.1	5	60	0	FC	Condensing	40	NG	122.4	43.1	8.3	37278.2	39.8	82.6	215.7	-264.2	-11.7	-40428.4	281.6	2
20	20	2	0.1	5	60	0	FC	Condensing	40	Elec	122.4	43.1	7.9	35680.5	37.8	84.6	215.7	-264.2	-11.7	-43439.4	280.6	2
20	20	2	0.1	5	60	0	FC	Condensing	20	NG	123.1	43.1	8.4	37844.5	40.5	82.6	215.7	-268.5	-11.9	-41082	285.8	2
20	20	2.5	0.1	5	60	0	FC	Condensing	20	NG	123.8	43.8	8.5	38399.7	41.2	82.6	215.7	-271.6	-12	-41526.6	288.9	2
10	40	2.5	0.2	5	60	0	FC	Condensing	20	NG	122.9	42.9	8.2	36949	39.4	83.5	214.7	-265	-11.7	-41840.5	281.9	2
20	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	108.6	28.5	5.4	24297.8	24.2	84.4	214	-233	-10.3	-38053.5	250.6	3
20	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	109.3	28.5	5	22733.8	22.1	87.1	214	-237.3	-10.5	-42990.6	253.5	3
20	40	1.6	0.1	5	60	0	FC	Condensing	20	NG	110.5	29.8	5.9	26772.4	27.2	83.3	213.3	-235.5	-10.4	-36980.6	253.4	3
20	20	2	0.1	5	80	0	FC	Condensing	20	NG	108.7	27.8	5.4	24381.7	24.2	84.5	214	-234.2	-10.4	-38311.2	251.8	3
20	20	2	0.1	5	80	0	FC	Condensing	20	Elec	108.7	27.8	4.9	22251.4	21.5	87.2	214	-234.2	-10.4	-42510.7	250.5	3
20	40	1.6	0.1	5	60	0	FC	Condensing	20	Elec	110.5	29.8	5.5	24642.1	24.5	86.1	213.3	-235.5	-10.4	-40855.5	252.1	3
20	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	109.3	28.5	5.5	24864	24.8	84.4	214	-237.3	-10.5	-38750.9	254.8	3
20	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	108.6	28.5	5	22700.1	22.1	86.5	214	-233	-10.3	-41092.9	249.7	3
20	40	1.6	0.1	5	60	0	FC	Condensing	40	NG	109.8	29.8	5.8	26206.1	26.5	83.3	213.3	-231.2	-10.2	-36309.8	249.2	3
20	40	1.6	0.1	5	60	0	FC	Condensing	40	Elec	109.8	29.8	5.5	24608.4	24.5	85.4	213.3	-231.2	-10.2	-39090.4	248.2	3

Big Box Retail - Lowest ICC - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	40	2.5	0.2	5	60	0	FC	Condensing	20	NG	147.4	65.9	10.7	48224.7	52.2	95.1	231.1	-163.2	-7.2	-44009.7	173.6	1
20	20	2	0.1	5	60	0	FC	Condensing	20	Elec	147.5	66.2	10.4	47038.3	50.7	96.8	230.9	-168.1	-7.4	-50479.5	177.7	1
20	20	2.5	0.1	5	60	0	FC	Condensing	20	Elec	148.1	67.1	10.6	47511.4	51.3	96.8	231	-171.2	-7.6	-51363.4	180.8	1
10	40	2.5	0.2	5	60	0	FC	Condensing	20	Elec	147.2	65.9	10.2	46087.7	49.5	97.7	231.1	-163.2	-7.2	-52065.3	172.4	1
20	20	2	0.1	5	60	0	FC	Condensing	40	NG	147	66.2	10.8	48609	52.8	94.2	230.9	-163.8	-7.3	-41967.2	174.7	1
20	20	2.5	0.1	5	60	0	FC	Condensing	40	NG	147.5	67.1	10.9	49082.1	53.3	94.2	231	-166.9	-7.4	-42727.6	177.8	1
20	20	2	0.1	5	60	0	FC	Condensing	20	NG	147.7	66.2	10.9	49175.3	53.4	94.2	230.9	-168.1	-7.4	-43061.2	178.9	1
20	20	2.5	0.1	5	60	0	FC	Condensing	20	NG	148.2	67.1	11	49648.4	54	94.2	231	-171.2	-7.6	-43820.8	182	1
20	20	2.5	0.1	5	60	0	FC	Condensing	40	Elec	147.4	67.1	10.5	47479.4	51.3	96.2	231	-166.9	-7.4	-48015.8	176.9	1
20	20	2	0.1	5	60	0	FC	Condensing	40	Elec	146.9	66.2	10.4	47006.3	50.7	96.2	230.9	-163.8	-7.3	-47165.6	173.8	1
20	40	2.5	0.1	5	60	0	RTU	RTU	40		149.3	42	8.9	39899.7	41.5	107.8	243.7	-144	-6.4	-234014.3	147.6	2
20	40	1.6	0.2	5	60	0.25	RTU	RTU	20		152.1	53	11.9	53417	58.6	93.5	230.2	-145.3	-6.4	-38253.1	155.5	2
20	40	2	0.1	5	60	0.25	RTU	RTU	20		144.1	48.1	10.5	47360.5	51.3	92.7	229.5	-145.2	-6.4	-36609.4	156.3	2
20	40	2.5	0.1	5	60	0.25	RTU	RTU	20		145.3	48.9	10.7	48365.8	52.5	92.8	229.5	-148.2	-6.6	-37488.1	159.2	2
20	40	2	0.2	5	60	0.25	RTU	RTU	40		152.4	53.6	11.9	53660.1	58.9	93.6	230.2	-147.3	-6.5	-38989	157.4	2
20	40	2	0.1	5	60	0	RTU	RTU	20		148.8	41.1	8.7	39348.4	40.8	108	243.8	-145.2	-6.4	-251767.3	148.7	2
20	40	2.5	0.1	5	60	0	RTU	RTU	20		150	42	9	40465.9	42.2	107.8	243.7	-148.2	-6.6	-240956.9	151.8	2
20	40	2.5	0.1	5	60	0.25	RTU	RTU	40		144.7	48.9	10.6	47799.5	51.9	92.8	229.5	-144	-6.4	-36408	155	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	132.2	51.3	7.5	33919.1	34.9	97.3	229.6	-144.4	-6.4	-44717.8	155	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	132.3	51.3	8	36056.1	37.7	94.7	229.6	-144.4	-6.4	-37971.9	156.2	2
20	40	1.2	0.1	5	60	0	RTU	RTU	20		146.8	39.5	8.3	37456.5	38.5	108.3	244	-129.7	-5.7	-252758.1	133.3	3
20	40	2.5	0.2	5	80	0.25	RTU	RTU	20		133.9	39.7	8.2	36948.4	38.7	95.2	230.4	-120.4	-5.3	-35209.2	131.1	3
20	20	1.2	0.1	5	80	0	RTU	RTU	20		148	39.7	8.4	37778.7	38.9	109.1	243.3	-122.2	-5.4	-378142.5	125.3	3
10	40	2	0.1	5	80	0	RTU	RTU	20		146.7	37.8	7.7	34616.4	34.9	111.7	244	-123.3	-5.5	485036.8	125.3	3
10	40	2.5	0.1	5	80	0	RTU	RTU	20		147.7	38.5	7.9	35539.5	36	111.7	244	-126.4	-5.6	505542.3	128.3	3
10	40	2.5	0.1	5	80	0	RTU	RTU	40		147.1	38.5	7.8	34973.2	35.3	111.7	244	-122.1	-5.4	488458.4	124.1	3
10	40	2	0.1	5	80	0	RTU	RTU	40		146	37.8	7.6	34050.2	34.2	111.7	244	-119	-5.3	468234.5	121.1	3
20	40	1.2	0.1	5	60	0	RTU	RTU	40		146.1	39.5	8.2	36890.3	37.9	108.3	244	-125.4	-5.6	-244433	129.1	3
20	60	2.5	0.1	5	60	0	RTU	RTU	20		142.8	37.6	7.8	34977.3	35.6	107.2	243	-121.4	-5.4	-159063.9	125.9	3
20	40	2.5	0.2	5	80	0	RTU	RTU	20		144.5	37.3	7.5	33693	33.9	110.7	243.1	-120.4	-5.3	6572346.9	123	3

Big Box Retail - Highest NPV - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	91.8	36.4	7.2	32534.9	35.7	56.1	82.4	-202.1	-8.9	-19365	230.1	1
4	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	99.6	43	8.9	40043.9	44.8	54.7	86.9	-202.1	-8.9	-18822.4	230.1	1
7	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	92	36.4	7.7	34671.9	38.4	53.5	82.4	-202.1	-8.9	-18355.9	231.3	1
7	20	2	0.2	5	60	0.5	FC	Condensing	20	NG	91.7	35.9	7.6	34427.2	38.1	53.5	82.4	-199.4	-8.8	-18118.3	228.6	1
10	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	88.5	33.3	7.1	32126.3	35.4	53.1	80.5	-202.1	-8.9	-18192.9	231.7	1
10	20	2	0.2	5	60	0.5	FC	Condensing	20	NG	87.9	32.8	7	31647.2	34.8	53.1	80.6	-199.4	-8.8	-17955.8	229.1	1
10	20	2.5	0.2	5	60	0.5	FC	Condensing	40	NG	87.8	33.3	7	31560.1	34.7	53.1	80.5	-198.4	-8.8	-17858.6	228.1	1
4	20	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	99.4	43	8.4	37906.9	42.1	57.3	86.9	-202.1	-8.9	-19884.9	228.9	1
10	20	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	88.3	33.3	6.7	29989.3	32.7	55.6	80.5	-202.1	-8.9	-19183.7	230.5	1
10	20	2	0.2	5	60	0.5	FC	Condensing	20	Elec	87.8	32.8	6.6	29510.2	32.1	55.7	80.6	-199.4	-8.8	-18933.9	227.9	1
7	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	107.7	29.1	9.2	41339.9	46	61.7	89.5	-202.8	-9	-22544.4	226.4	2
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	103.5	27.3	8.7	38993	43.2	60.3	86.3	-205.4	-9.1	-22068.7	230	2
10	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	98.9	24	7.8	34929.7	38.3	60.5	86.2	-199.9	-8.8	-21590.1	224.7	2
10	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	102.8	26.8	8.5	38391.3	42.5	60.3	86.3	-202.8	-9	-21800	227.4	2
10	20	2.5	0.2	5	60	0.5	RTU	RTU	40	NG	102.8	27.3	8.5	38426.7	42.5	60.3	86.3	-201.7	-8.9	-21669.7	226.4	2
7	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	108.4	29.6	9.3	41927.4	46.7	61.7	89.5	-205.4	-9.1	-22828.1	229	2
10	20	2.5	0.2	5	60	0.25	FC	Condensing	20	Elec	95.4	27.2	5.7	25493.7	26.5	68.9	96.8	-202.1	-8.9	-26639.4	223.7	2
10	20	2.5	0.2	5	60	0.25	FC	Condensing	20	NG	95.6	27.2	6.1	27630.7	29.2	66.3	96.8	-202.1	-8.9	-24766.5	225	2
7	20	2.5	0.2	5	60	0.5	RTU	RTU	40	NG	107.7	29.6	9.2	41361.2	46	61.7	89.5	-201.7	-8.9	-22415.4	225.4	2
7	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	103.7	26.3	8.4	37913.4	41.8	61.8	89.3	-199.9	-8.8	-22296.6	223.8	2
7	20	2.5	0.1	5	60	0.25	RTU	RTU	40	NG	108.8	19.8	6.7	29951.7	31.4	77.4	108.3	-196.2	-8.7	-35630.5	212.3	3
10	20	2.5	0.1	5	60	0.25	RTU	RTU	40	NG	104.1	17.5	6	27075.4	28	76.1	105.2	-196.2	-8.7	-33790.4	213.3	3
10	20	2.5	0.1	5	60	0	FC	Condensing	20	NG	101.2	18.9	4.8	21550.7	21.1	80.1	110.4	-196.6	-8.7	-38453.6	212.5	3
10	20	2	0.1	5	60	0.25	RTU	RTU	20	NG	104.1	17	6	27093.2	28	76.1	105.2	-197.2	-8.7	-34029.8	214.3	3
10	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	104.7	17.5	6.1	27641.6	28.7	76.1	105.2	-199.9	-8.8	-34430.2	217	3
7	20	2	0.1	5	60	0.25	RTU	RTU	20	NG	108.8	19.3	6.7	29983.3	31.4	77.4	108.3	-197.2	-8.7	-35852	213.3	3
7	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	109.5	19.8	6.8	30517.9	32	77.4	108.3	-199.9	-8.8	-36305.1	216	3
10	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	116.8	15.8	5.8	26281.6	26.2	90.7	123.3	-205.4	-9.1	-80185.1	214.7	3
10	20	1.6	0.2	5	60	0.25	RTU	RTU	20	NG	107.9	19.8	6.8	30426.5	32	75.9	105.4	-197.4	-8.7	-33817.1	214.3	3
10	20	2	0.2	5	60	0	RTU	RTU	20	NG	116.2	15.4	5.7	25731.4	25.5	90.8	123.4	-202.8	-9	-79646.5	212	3

Big Box Retail - Highest NPV - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	127.4	36.9	11.1	50013.4	55.8	71.6	133.8	-224.1	-9.9	-23550.9	246.4	1
10	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	121.2	34.3	10.4	46702.8	51.9	69.3	132	-224.1	-9.9	-22359.1	247.9	1
10	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	126.2	37.5	11.2	50576.8	56.6	69.7	132.4	-226.8	-10	-22809.2	250.1	1
10	20	2	0.1	5	60	0.5	RTU	RTU	20	NG	120.5	33.8	10.2	46112.9	51.2	69.3	132	-221.6	-9.8	-22083.9	245.5	1
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	127	37.9	11.4	51176.1	57.3	69.7	132.4	-229.4	-10.2	-23086.3	252.6	1
7	20	2	0.2	5	60	0.5	RTU	RTU	40	NG	131.7	40	11.8	53325.8	59.7	71.9	134.1	-223.3	-9.9	-23660.6	245.1	1
7	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	132.4	40	12	53892	60.4	71.9	134.1	-226.8	-10	-24034.5	248.6	1
10	20	2.5	0.2	5	60	0.5	RTU	RTU	40	NG	126.3	37.9	11.2	50609.9	56.6	69.7	132.4	-225.9	-10	-22731.2	249.1	1
10	20	2	0.2	5	60	0.5	RTU	RTU	40	NG	125.6	37.5	11.1	50010.5	55.9	69.7	132.4	-223.3	-9.9	-22454.4	246.6	1
7	20	2.5	0.2	5	60	0.5	RTU	RTU	40	NG	132.4	40.5	12	53909.4	60.4	72	134.2	-225.9	-10	-23960.1	247.6	1
10	20	1.6	0.1	5	60	0.25	RTU	RTU	40	NG	125.3	27.3	8.5	38170.9	40.8	84.5	146	-212.9	-9.4	-31984.4	229.3	2
10	40	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	106.8	25.3	7.9	35464.2	38.5	68.3	131.4	-202	-8.9	-19728.4	227.4	2
20	20	2	0.2	5	60	0	FC	Condensing	20	NG	114.8	29.8	6.7	30009.1	31	83.7	144.6	-208	-9.2	-30504.6	225.5	2
20	20	1.6	0.2	5	60	0.25	RTU	RTU	20	NG	123.5	27.2	8.6	38535.6	41.4	82.1	144.3	-206.1	-9.1	-28697.9	223.7	2
10	40	2.5	0.1	5	60	0.5	RTU	RTU	40	NG	106.2	25.3	7.8	34898	37.8	68.3	131.4	-198.4	-8.8	-19383.7	223.9	2
10	20	1.2	0.1	5	60	0.25	RTU	RTU	20	NG	125.3	26.9	8.5	38226.3	40.9	84.5	146	-208.8	-9.2	-31358.6	225.2	2
10	20	1.6	0.1	5	60	0.25	RTU	RTU	20	NG	125.9	27.3	8.6	38737.2	41.5	84.5	146	-216.4	-9.6	-32514.5	232.8	2
20	20	2	0.2	5	60	0	FC	Condensing	20	Elec	114.7	29.8	6.2	27872	28.3	86.3	144.6	-208	-9.2	-33307.2	224.3	2
10	20	2.5	0.1	5	80	0.5	FC	Condensing	20	NG	88.2	28.7	6.1	27427.8	29.4	58.8	121.3	-192.7	-8.5	-15590.5	224	2
10	20	2.5	0.2	5	80	0.5	RTU	RTU	20	NG	109.3	25.4	7.9	35716.8	38.7	70.6	132.4	-201.1	-8.9	-20644.4	225.2	2
10	20	2.5	0.1	5	80	0.5	RTU	RTU	20	NG	103.8	21.9	7	31414.6	33.5	70.2	132	-195.8	-8.7	-19941.9	220.6	3
20	20	2	0.1	5	60	0.25	RTU	RTU	20	NG	118.8	23.8	7.6	34355.6	36.3	82.4	144.5	-205.9	-9.1	-28976.9	223.7	3
10	20	2	0.2	5	80	0.5	RTU	RTU	20	NG	108.5	24.9	7.8	35144.4	38	70.5	132.4	-198.5	-8.8	-20366.7	222.8	3
20	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	119.5	24.3	7.8	34981.8	37.1	82.4	144.4	-208.4	-9.2	-29264.2	226.3	3
10	40	2	0.2	5	60	0.25	RTU	RTU	20	NG	118.7	22.8	7.4	33123.1	34.8	83.9	145.7	-204.7	-9.1	-30179.1	221.8	3
10	40	2	0.1	5	60	0.5	RTU	RTU	20	NG	106.1	24.8	7.7	34874.2	37.8	68.3	131.4	-199.4	-8.8	-19471	224.9	3
10	40	2.5	0.2	5	60	0.25	RTU	RTU	20	NG	119.4	23.2	7.5	33699.2	35.5	83.9	145.8	-207.3	-9.2	-30577.2	224.3	3
10	40	2.5	0.2	5	60	0.25	RTU	RTU	40	NG	118.7	23.2	7.4	33132.9	34.8	83.9	145.8	-203.7	-9	-30056.6	220.9	3
20	20	2.5	0.1	5	60	0.25	RTU	RTU	40	NG	118.8	24.3	7.6	34415.6	36.4	82.4	144.4	-204.9	-9.1	-28768.9	222.8	3
10	40	2	0.1	5	60	0.5	RTU	RTU	40	NG	105.4	24.8	7.6	34308	37.1	68.3	131.4	-195.9	-8.7	-19126.5	221.4	3

Big Box Retail - Highest NPV - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	2	0.2	5	60	0	FC	Condensing	40	NG	127	48.2	9.1	41149.3	44.5	82.5	216	-270.6	-12	-41242.8	287.7	1
20	20	2.5	0.2	5	60	0	FC	Condensing	40	Elec	127.7	48.9	8.9	40132.1	43.2	84.5	216	-273.7	-12.1	-44798.5	289.8	1
10	40	2.5	0.2	5	60	0.25	FC	Condensing	20	Elec	116.2	49.2	8.8	39611.5	43.2	73	203.4	-265	-11.7	-30609.3	287.3	1
20	20	2	0.2	5	60	0	FC	Condensing	20	Elec	127.6	48.2	8.8	39585.3	42.5	85.2	216	-274.8	-12.2	-46141.5	290.6	1
20	20	2.5	0.2	5	60	0	FC	Condensing	20	Elec	128.3	48.9	8.9	40165.8	43.2	85.2	216	-277.9	-12.3	-46650.7	293.7	1
20	20	2.5	0.2	5	60	0	FC	Condensing	40	NG	127.7	48.9	9.3	41729.8	45.2	82.5	216	-273.7	-12.1	-41706.1	290.7	1
20	20	2	0.2	5	60	0	FC	Condensing	40	Elec	127	48.2	8.8	39551.6	42.5	84.5	216	-270.6	-12	-44301.5	286.7	1
20	20	2.5	0.2	5	60	0	FC	Condensing	20	NG	128.3	48.9	9.4	42296.1	45.9	82.5	216	-277.9	-12.3	-42357.1	294.9	1
20	20	2	0.2	5	60	0	FC	Condensing	20	NG	127.6	48.2	9.3	41715.6	45.2	82.5	216	-274.8	-12.2	-41893.9	291.9	1
10	40	2.5	0.2	5	60	0.25	FC	Condensing	20	NG	116.2	49.2	9.3	41741.7	45.9	70.3	203.4	-265	-11.7	-28613.1	288.6	1
20	20	2.5	0.1	5	60	0	FC	Condensing	40	NG	123.1	43.8	8.4	37833.5	40.5	82.6	215.7	-267.3	-11.8	-40873.4	284.6	2
20	20	2.5	0.1	5	60	0	FC	Condensing	40	Elec	123.1	43.8	8	36235.8	38.5	84.6	215.7	-267.3	-11.8	-43915.3	283.7	2
20	20	2.5	0.1	5	60	0	FC	Condensing	20	NG	123.8	43.8	8.5	38399.7	41.2	82.6	215.7	-271.6	-12	-41526.6	288.9	2
20	20	2	0.1	5	60	0	FC	Condensing	20	NG	123.1	43.1	8.4	37844.5	40.5	82.6	215.7	-268.5	-11.9	-41082	285.8	2
10	40	2.5	0.1	5	60	0.25	FC	Condensing	20	Elec	111.4	44	7.9	35586.5	38.4	73	203	-258.6	-11.4	-29860.3	281.3	2
20	20	2	0.1	5	60	0	FC	Condensing	20	Elec	123.1	43.1	7.9	35714.2	37.8	85.3	215.7	-268.5	-11.9	-45265.5	284.5	2
10	40	2.5	0.2	5	60	0	FC	Condensing	20	NG	122.9	42.9	8.2	36949	39.4	83.5	214.7	-265	-11.7	-41840.5	281.9	2
20	20	2.5	0.1	5	60	0	FC	Condensing	20	Elec	123.8	43.8	8.1	36269.4	38.5	85.3	215.7	-271.6	-12	-45752	287.6	2
10	40	2.5	0.1	5	60	0.25	FC	Condensing	20	NG	111.4	44	8.4	37716.8	41.1	70.3	203	-258.6	-11.4	-27913.6	282.6	2
20	20	2	0.1	5	60	0	FC	Condensing	40	NG	122.4	43.1	8.3	37278.2	39.8	82.6	215.7	-264.2	-11.7	-40428.4	281.6	2
20	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	109.3	28.5	5	22733.8	22.1	87.1	214	-237.3	-10.5	-42990.6	253.5	3
10	40	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	97.4	28.5	5.4	24299.6	24.9	72.5	201.1	-224.3	-9.9	-25565.7	248.4	3
20	40	1.6	0.1	5	60	0	FC	Condensing	20	Elec	110.5	29.8	5.5	24642.1	24.5	86.1	213.3	-235.5	-10.4	-40855.5	252.1	3
20	20	2	0.1	5	80	0	FC	Condensing	20	NG	108.7	27.8	5.4	24381.7	24.2	84.5	214	-234.2	-10.4	-38311.2	251.8	3
20	40	1.6	0.1	5	60	0	FC	Condensing	40	NG	109.8	29.8	5.8	26206.1	26.5	83.3	213.3	-231.2	-10.2	-36309.8	249.2	3
20	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	109.3	28.5	5.5	24864	24.8	84.4	214	-237.3	-10.5	-38750.9	254.8	3
20	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	108.6	28.5	5	22700.1	22.1	86.5	214	-233	-10.3	-41092.9	249.7	3
20	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	108.6	28.5	5.4	24297.8	24.2	84.4	214	-233	-10.3	-38053.5	250.6	3
20	40	1.6	0.1	5	60	0	FC	Condensing	20	NG	110.5	29.8	5.9	26772.4	27.2	83.3	213.3	-235.5	-10.4	-36980.6	253.4	3
20	20	2	0.1	5	80	0	FC	Condensing	20	Elec	108.7	27.8	4.9	22251.4	21.5	87.2	214	-234.2	-10.4	-42510.7	250.5	3

Big Box Retail - Highest NPV - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
20	20	2.5	0.1	5	60	0	FC	Condensing	40	Elec	147.4	67.1	10.5	47479.4	51.3	96.2	231	-166.9	-7.4	-48015.8	176.9	1
20	40	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	125.6	70.8	10.9	49062.3	54.7	70.9	208.1	-150.8	-6.7	-16593.9	174.3	1
20	20	2	0.1	5	60	0	FC	Condensing	20	Elec	147.5	66.2	10.4	47038.3	50.7	96.8	230.9	-168.1	-7.4	-50479.5	177.7	1
20	20	2.5	0.1	5	60	0	FC	Condensing	20	NG	148.2	67.1	11	49648.4	54	94.2	231	-171.2	-7.6	-43820.8	182	1
20	20	2	0.1	5	60	0	FC	Condensing	40	NG	147	66.2	10.8	48609	52.8	94.2	230.9	-163.8	-7.3	-41967.2	174.7	1
20	20	2.5	0.1	5	60	0	FC	Condensing	40	NG	147.5	67.1	10.9	49082.1	53.3	94.2	231	-166.9	-7.4	-42727.6	177.8	1
20	40	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	125.7	70.8	11.4	51199.3	57.4	68.3	208.1	-150.8	-6.7	-15608.5	175.5	1
10	40	2.5	0.1	5	60	0.25	FC	Condensing	20	NG	134.8	66.2	10.7	48037.1	52.8	82	219.5	-156.8	-6.9	-23671.1	174.4	1
20	20	2	0.1	5	60	0	FC	Condensing	20	NG	147.7	66.2	10.9	49175.3	53.4	94.2	230.9	-168.1	-7.4	-43061.2	178.9	1
20	20	2.5	0.1	5	60	0	FC	Condensing	20	Elec	148.1	67.1	10.6	47511.4	51.3	96.8	231	-171.2	-7.6	-51363.4	180.8	1
20	20	2.5	0.1	5	80	0.5	RTU	RTU	20	NG	140.6	54.9	12.3	55271.4	61.7	78.9	215.4	-140.8	-6.2	-20021.1	158.7	2
20	40	1.6	0.2	5	60	0.25	RTU	RTU	20	NG	152.1	53	11.9	53417	58.6	93.5	230.2	-145.3	-6.4	-38253.1	155.5	2
20	40	2	0.1	5	60	0.25	RTU	RTU	20	NG	144.1	48.1	10.5	47360.5	51.3	92.7	229.5	-145.2	-6.4	-36609.4	156.3	2
20	40	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	145.3	48.9	10.7	48365.8	52.5	92.8	229.5	-148.2	-6.6	-37488.1	159.2	2
20	40	2	0.2	5	60	0.25	RTU	RTU	40	NG	152.4	53.6	11.9	53660.1	58.9	93.6	230.2	-147.3	-6.5	-38989	157.4	2
20	40	2.5	0.1	5	60	0.25	RTU	RTU	40	NG	144.7	48.9	10.6	47799.5	51.9	92.8	229.5	-144	-6.4	-36408	155	2
20	20	2	0.1	5	80	0.5	RTU	RTU	20	NG	139.3	54.1	12.1	54298.3	60.5	78.8	215.3	-137.7	-6.1	-19526.7	155.7	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	132.3	51.3	8	36056.1	37.7	94.7	229.6	-144.4	-6.4	-37971.9	156.2	2
20	20	2.5	0.1	5	80	0.5	RTU	RTU	40	NG	139.9	54.9	12.2	54705.2	61	78.9	215.4	-136.5	-6	-19413.7	154.5	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	132.2	51.3	7.5	33919.1	34.9	97.3	229.6	-144.4	-6.4	-44717.8	155	2
20	40	2.5	0.2	5	80	0.25	RTU	RTU	40	NG	133.2	39.7	8.1	36382.2	38	95.2	230.4	-116.1	-5.1	-33960	126.9	3
20	40	1.2	0.1	5	60	0	RTU	RTU	40	NG	146.1	39.5	8.2	36890.3	37.9	108.3	244	-125.4	-5.6	-244433	129.1	3
20	40	2	0.2	5	80	0.25	RTU	RTU	20	NG	132.7	39	8	36036.9	37.6	95.1	230.2	-117.3	-5.2	-34068.2	128.2	3
20	40	2.5	0.1	5	80	0.5	RTU	RTU	20	NG	117.8	39.8	8.1	36361.9	39	78.8	215.2	-114	-5	-16158.8	133.7	3
20	40	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	133.9	39.7	8.2	36948.4	38.7	95.2	230.4	-120.4	-5.3	-35209.2	131.1	3
20	40	1.2	0.1	5	60	0	RTU	RTU	20	NG	146.8	39.5	8.3	37456.5	38.5	108.3	244	-129.7	-5.7	-252758.1	133.3	3
10	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	147.7	38.5	7.9	35539.5	36	111.7	244	-126.4	-5.6	505542.3	128.3	3
20	40	2.5	0.1	5	80	0.5	RTU	RTU	40	NG	117.1	39.8	8	35795.6	38.3	78.8	215.2	-109.7	-4.9	-15553.3	129.5	3
20	40	2	0.1	5	80	0.5	RTU	RTU	20	NG	116.6	39	7.9	35412.6	37.8	78.7	215.2	-110.9	-4.9	-15679.1	130.7	3
20	40	2	0.1	5	80	0.5	RTU	RTU	40	NG	115.9	39	7.7	34846.4	37.2	78.7	215.2	-106.6	-4.7	-15075.3	126.5	3

Big Box Retail - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.2	5	60	0	FC	ASHP	20	NG	95.2	31.4	2	9211.4	5.7	89.5	125	-159.7	-7.1	-52749.8	171.7	1
4	20	2	0.2	5	60	0	FC	ASHP	20	NG	95.1	31	2	9176.9	5.7	89.4	124.7	-157	-6.9	-51587.9	169	1
4	20	1.6	0.2	5	60	0	FC	ASHP	20	NG	95.1	30.6	2	9158.4	5.7	89.4	124.7	-151.6	-6.7	-49869.7	163.7	1
4	20	1.2	0.2	5	60	0	FC	ASHP	20	NG	95	30.2	2	9143.6	5.7	89.4	124.8	-143.6	-6.4	-47141.8	155.6	1
4	20	2.5	0.2	5	60	0	FC	ASHP	40	NG	94.5	31.4	1.9	8645.2	5.1	89.5	125	-156	-6.9	-51523	168	1
4	20	2	0.2	5	60	0	FC	ASHP	40	NG	94.4	31	1.9	8610.6	5	89.4	124.7	-153.3	-6.8	-50367.6	165.4	1
4	20	1.6	0.2	5	60	0	FC	ASHP	40	NG	94.4	30.6	1.9	8592.1	5	89.4	124.7	-147.9	-6.5	-48648.2	160	1
4	20	1.2	0.2	5	60	0	FC	ASHP	40	NG	94.4	30.2	1.9	8577.3	5	89.4	124.8	-139.8	-6.2	-45922.1	151.9	1
4	20	2.5	0.2	5	60	0	FC	Condensing	20	Elec	114.1	31.4	6.5	29319.3	30.2	83.9	116.6	-202.1	-8.9	-47507.3	215.3	1
4	20	2	0.2	5	60	0	FC	Condensing	20	Elec	113.8	31	6.4	29011.1	29.8	84	116.5	-199.4	-8.8	-46942.4	212.6	1
4	20	0.8	0.2	20	80	0	RTU	RTU	40	NG	122.6	11.5	4.7	21064.3	19.1	103.5	144.6	59.3	2.6	-210646.5	-56.5	2
4	20	2	0.2	20	60	0	RTU	RTU	40	NG	132.6	20.4	7.1	31920.5	32.4	100.2	143.9	-92.7	-4.1	-208014.8	96.3	2
4	20	2.5	0.1	20	60	0	RTU	RTU	40	NG	130.6	19.1	6.7	30289.9	30.4	100.2	143.4	-97.9	-4.3	-214395.3	101.6	2
4	20	2.5	0.2	20	60	0	RTU	RTU	40	NG	134.6	21.9	7.5	33714.4	34.5	100.1	143.7	-103.4	-4.6	-221575.3	106.9	2
4	40	2.5	0.1	20	60	0	RTU	RTU	20	NG	124.6	14.4	5.6	25079.2	24.1	100.5	141.7	-78.3	-3.5	-207380	82.3	2
4	40	2.5	0.2	20	60	0	RTU	RTU	20	NG	128.5	17.1	6.3	28392.1	28.1	100.4	141.6	-83.8	-3.7	-206842.3	87.7	2
4	20	2	0.1	20	60	0	RTU	RTU	20	NG	129.3	17.7	6.5	29123	29	100.3	143.6	-90.8	-4	-209563.3	94.6	2
4	20	2	0.2	20	60	0	RTU	RTU	20	NG	133.3	20.4	7.2	32486.7	33	100.2	143.9	-96.4	-4.3	-216352.8	99.9	2
4	20	2.5	0.1	20	60	0	RTU	RTU	20	NG	131.2	19.1	6.9	30856.1	31.1	100.2	143.4	-101.6	-4.5	-222531.8	105.3	2
4	20	2.5	0.2	20	60	0	RTU	RTU	20	NG	135.3	21.9	7.6	34280.6	35.2	100.1	143.7	-107.1	-4.7	-229532.8	110.6	2
7	40	2	0.1	20	80	0	RTU	RTU	20	NG	113.4	5.8	3.2	14597.3	11.5	101.9	136.8	-37.7	-1.7	-565629.3	42	3
7	40	0.8	0.2	20	80	0	RTU	RTU	20	NG	112.7	5.1	3	13724.6	10.4	102.3	137.3	78.9	3.5	-2835616.7	-74.8	3
7	60	1.2	0.1	20	80	0	RTU	RTU	20	NG	110.3	3.4	2.6	11588.7	7.8	102.4	136	39.4	1.7	-774388.2	-35.1	3
7	60	0.8	0.1	20	80	0	RTU	RTU	20	NG	109.5	2.6	2.4	10606.5	6.6	102.9	136.5	107.8	4.8	-678617.1	-103.7	3
10	40	0.8	0.1	20	80	0	RTU	RTU	20	NG	107.9	2	2.2	9776.2	5.7	102.2	135.4	84.5	3.7	-11893697.3	-80	3
7	40	2	0.1	20	80	0	RTU	RTU	40	NG	112.7	5.8	3.1	14031.1	10.8	101.9	136.8	-34	-1.5	-509972.1	38.3	3
7	40	0.8	0.2	20	80	0	RTU	RTU	40	NG	112.1	5.1	2.9	13158.4	9.7	102.3	137.3	82.6	3.7	-2969045.7	-78.5	3
7	60	1.2	0.1	20	80	0	RTU	RTU	40	NG	109.6	3.4	2.4	11022.4	7.1	102.4	136	43.1	1.9	-847476.2	-38.8	3
7	60	0.8	0.1	20	80	0	RTU	RTU	40	NG	108.9	2.6	2.2	10040.3	5.9	102.9	136.5	111.5	4.9	-702001.6	-107.4	3
10	40	0.8	0.1	20	80	0	RTU	RTU	40	NG	107.2	2	2	9210	5	102.2	135.4	88.2	3.9	-12416570.1	-83.6	3

Big Box Retail - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2	0.1	5	80	0	FC	Condensing	20	Elec	119.4	30.1	6.2	27939.1	28.1	91.3	144.8	-190.1	-8.4	-37014.4	203.7	1
4	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	119.8	30.6	6.3	28275.4	28.5	91.3	144.9	-192.7	-8.5	-37504.5	206.2	1
10	20	2.5	0.1	5	60	0	FC	ASHP	40	NG	97.7	31.3	1.9	8773.9	5	92.7	153.3	-177.1	-7.8	-36597.2	191.8	1
4	20	2	0.1	5	80	0	FC	ASHP	40	NG	101.2	30.1	2	8813.3	4.9	96.4	152.7	-146.3	-6.5	-36441	158.9	1
4	20	2.5	0.1	5	80	0	FC	ASHP	40	NG	101.4	30.6	2	8852.1	4.9	96.5	152.9	-148.8	-6.6	-37294.5	161.4	1
10	20	2	0.1	5	60	0	FC	ASHP	20	NG	98.2	30.8	2.1	9283.8	5.6	92.5	153.1	-178.1	-7.9	-36561	192.8	1
10	20	2.5	0.1	5	60	0	FC	ASHP	20	NG	98.4	31.3	2.1	9340.2	5.7	92.7	153.3	-180.7	-8	-37326.2	195.2	1
4	20	2	0.1	5	80	0	FC	ASHP	20	NG	101.9	30.1	2.1	9379.5	5.5	96.4	152.7	-149.8	-6.6	-37320	162.4	1
10	20	2.5	0.1	5	60	0	FC	Condensing	20	Elec	117	31.3	6.5	29179.3	29.9	87.1	144.9	-221	-9.8	-36421.5	236.7	1
4	20	2.5	0.1	5	80	0	FC	ASHP	20	NG	102	30.6	2.1	9418.4	5.6	96.5	152.9	-152.4	-6.7	-38178.6	164.9	1
4	60	2	0.1	5	80	0	RTU	RTU	40	NG	130.4	15.6	5.5	24688.4	23.3	107.1	179.9	-145.5	-6.4	-89721.4	150.8	2
4	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	131	16	5.6	25161.8	23.8	107.2	179.7	-148	-6.6	-91627.6	153.3	2
4	40	0.8	0.1	5	80	0	RTU	RTU	40	NG	131.2	15.6	5.5	24839	23.4	107.7	169.1	-138.6	-6.1	-93231.5	143.5	2
4	40	1.2	0.1	5	80	0	RTU	RTU	40	NG	131.7	16	5.6	25288.1	24	107.7	169	-154.8	-6.9	-104336.6	159.7	2
4	40	1.6	0.1	5	80	0	RTU	RTU	40	NG	132.2	16.3	5.7	25704.3	24.5	107.8	168.8	-162.5	-7.2	-109996.9	167.4	2
4	60	2	0.1	5	80	0	RTU	RTU	20	NG	131.1	15.6	5.6	25254.7	23.9	107.1	179.9	-149	-6.6	-91897.7	154.3	2
4	60	1.6	0.1	5	80	0	RTU	RTU	20	NG	130.6	15.3	5.5	24860.1	23.5	107.1	180.1	-143.9	-6.4	-88434.2	149.2	2
4	60	2.5	0.1	5	80	0	RTU	RTU	20	NG	131.7	16	5.7	25728	24.5	107.2	179.7	-151.6	-6.7	-93811.7	156.8	2
4	40	0.8	0.1	5	80	0	RTU	RTU	20	NG	131.8	15.6	5.6	25405.3	24.1	107.7	169.1	-142.1	-6.3	-95605.4	147	2
4	40	1.2	0.1	5	80	0	RTU	RTU	20	NG	132.4	16	5.7	25854.4	24.6	107.7	169	-158.4	-7	-106714.5	163.2	2
10	20	1.6	0.1	5	80	0	RTU	RTU	20	NG	121.7	12.8	4.8	21650	19.9	101.7	160.2	-188.2	-8.3	-66696.7	196.7	3
10	20	2.5	0.1	5	80	0	RTU	RTU	20	NG	122.7	13.6	5	22604.7	21.1	101.6	160.2	-195.8	-8.7	-68952.5	204.3	3
7	40	1.6	0.1	5	80	0	RTU	RTU	20	NG	120.7	11.1	4.3	19496.9	17.3	103.4	167.8	-166	-7.3	-67857.4	173.8	3
7	40	2	0.1	5	80	0	RTU	RTU	20	NG	121.1	11.4	4.4	19908.3	17.8	103.4	167.6	-171.1	-7.6	-69715.8	178.9	3
7	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	121.7	11.8	4.5	20404.1	18.4	103.3	167.3	-173.7	-7.7	-70453.1	181.5	3
10	20	2.5	0.1	5	80	0	RTU	RTU	40	NG	122.1	13.6	4.9	22038.5	20.4	101.6	160.2	-192.3	-8.5	-67710	200.8	3
7	40	2.5	0.1	5	80	0	RTU	RTU	40	NG	121	11.8	4.4	19837.8	17.7	103.3	167.3	-170.2	-7.5	-69021.9	178	3
7	40	2	0.1	5	80	0	RTU	RTU	40	NG	120.5	11.4	4.3	19342.1	17.1	103.4	167.6	-167.6	-7.4	-68278.4	175.4	3
10	20	2	0.1	5	80	0	RTU	RTU	20	NG	122.2	13.2	4.9	22083.4	20.5	101.7	160.2	-193.3	-8.6	-68310.2	201.8	3
10	20	2	0.1	5	80	0	RTU	RTU	40	NG	121.5	13.2	4.8	21517.2	19.8	101.7	160.2	-189.7	-8.4	-67063	198.3	3

Big Box Retail - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.2	20	60	0	RTU	RTU	20	NG	189.8	57.6	16.3	73545.2	81.9	107.9	234.7	-128.5	-5.7	-202763.1	128.2	1
4	20	2	0.2	20	60	0	RTU	RTU	40	NG	185.5	55.1	15.5	69904.2	77.5	108	234.8	-111.9	-5	-179649.1	111.8	1
4	20	2	0.1	20	60	0	RTU	RTU	40	NG	178.2	50.3	14.2	63902.6	70.3	107.9	234.8	-105.5	-4.7	-166203.1	106	1
4	40	2.5	0.2	20	60	0	RTU	RTU	40	NG	172.1	46	13	58588.2	63.9	108.2	235	-97.5	-4.3	-169920.3	98.3	1
4	20	2.5	0.2	20	60	0	RTU	RTU	40	NG	189.1	57.6	16.2	72979	81.2	107.9	234.7	-124.3	-5.5	-196025.5	124	1
4	40	2.5	0.2	20	60	0	RTU	RTU	20	NG	172.8	46	13.1	59154.4	64.6	108.2	235	-101.7	-4.5	-177366	102.6	1
4	20	2	0.1	20	60	0	RTU	RTU	20	NG	178.9	50.3	14.3	64468.8	71	107.9	234.8	-109.8	-4.9	-172931.3	110.3	1
4	20	2	0.2	20	60	0	RTU	RTU	20	NG	186.2	55.1	15.7	70470.4	78.2	108	234.8	-116.2	-5.1	-186506.6	116.1	1
4	20	2.5	0.1	20	60	0	RTU	RTU	20	NG	182.5	52.7	15	67481.7	74.6	107.9	234.7	-122.2	-5.4	-188701.3	122.4	1
4	20	2.5	0.1	20	60	0	RTU	RTU	40	NG	181.8	52.7	14.9	66915.4	73.9	107.9	234.7	-117.9	-5.2	-182103.2	118.2	1
4	60	0.8	0.1	20	80	0	RTU	RTU	40	NG	139.7	23	6.5	29362.3	28.6	111.1	239.4	122.9	5.4	-1942178.1	-120.9	2
7	40	2.5	0.2	5	80	0	RTU	RTU	40	NG	138.8	28.4	8	36124.4	37.3	101.4	226	-175.5	-7.8	-84702.6	182.1	2
7	40	2	0.2	5	80	0	RTU	RTU	40	NG	137.9	27.7	7.8	35343.5	36.4	101.5	226	-172.4	-7.6	-83404.2	179.1	2
7	20	1.6	0.1	5	80	0	RTU	RTU	40	NG	140.6	29.9	8.5	38207.9	39.9	100.8	227.8	-186.6	-8.3	-83963.3	193.4	2
7	40	2	0.1	5	80	0	RTU	RTU	20	NG	131.6	23	6.7	30017	30	101.6	226.1	-170.3	-7.5	-83726.2	177.3	2
7	40	2	0.2	5	80	0	RTU	RTU	20	NG	138.5	27.7	8	35909.8	37.1	101.5	226	-176.7	-7.8	-85470.5	183.3	2
7	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	132.5	23.6	6.8	30768.9	30.9	101.6	226.1	-173.4	-7.7	-84995.5	180.4	2
7	40	2.5	0.2	5	80	0	RTU	RTU	20	NG	139.5	28.4	8.1	36690.6	38	101.4	226	-179.8	-8	-86764.1	186.3	2
4	60	0.8	0.1	20	80	0	RTU	RTU	20	NG	140.4	23	6.6	29928.6	29.3	111.1	239.4	118.6	5.2	-1874672.2	-116.7	2
7	40	2.5	0.1	5	80	0	RTU	RTU	40	NG	131.8	23.6	6.7	30202.7	30.2	101.6	226.1	-169.1	-7.5	-82901.7	176.2	2
7	40	1.2	0.1	5	80	0	RTU	RTU	40	NG	129.4	22	6.3	28179.5	27.8	101.7	226.1	-150.6	-6.7	-74352.4	157.8	3
10	40	2.5	0.1	5	80	0	RTU	RTU	40	NG	124.4	19.8	5.6	25280.4	24.4	100	224.8	-169.1	-7.5	-70687.2	177.5	3
7	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	129.2	22.3	6.2	28009.8	27.6	101.6	236.7	-142.3	-6.3	-69908.2	149.6	3
10	40	1.6	0.1	5	80	0	RTU	RTU	20	NG	123.5	18.7	5.4	24466.1	23.4	100.1	224.9	-164.1	-7.3	-69305.9	172.5	3
10	40	2	0.1	5	80	0	RTU	RTU	20	NG	124.2	19.2	5.6	25091	24.2	100.1	224.9	-170.3	-7.5	-71587.9	178.6	3
10	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	125.1	19.8	5.7	25846.6	25.1	100	224.8	-173.4	-7.7	-72472.5	181.7	3
7	60	2	0.1	5	80	0	RTU	RTU	20	NG	129	21.8	6.2	27835.4	27.4	101.6	237.2	-143.5	-6.4	-70752.9	150.7	3
7	60	2.5	0.1	5	80	0	RTU	RTU	20	NG	129.9	22.3	6.3	28576	28.3	101.6	236.7	-146.6	-6.5	-72006.2	153.8	3
10	40	2	0.1	5	80	0	RTU	RTU	40	NG	123.6	19.2	5.4	24524.8	23.5	100.1	224.9	-166	-7.3	-69792.4	174.4	3
10	40	1.6	0.2	5	80	0	RTU	RTU	40	NG	129.7	23.3	6.6	29626	29.6	100	225	-166.2	-7.4	-69772.1	174.2	3

Big Box Retail - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	60	2	0.1	20	60	0	FC	ASHP	40	NG	118	57.6	2.4	10663	6.2	111.8	245.5	47	2.1	-6657230.3	-42.3	1
10	40	1.2	0.2	5	60	0	FC	ASHP	40	NG	118.4	63.6	2.5	11182.6	6.8	111.6	247.9	-91.6	-4.1	-2229578.3	96.4	1
10	40	1.6	0.2	5	60	0	FC	ASHP	40	NG	118.6	64.4	2.5	11212.6	6.8	111.7	248.1	-100.9	-4.5	-5776956.7	105.7	1
40	40	2.5	0.2	20	60	0	FC	ASHP	20	NG	119	60.7	2.6	11518.4	7.2	111.9	246.8	151.6	6.7	-11457973.8	-147	1
20	20	1.6	0.1	5	60	0	FC	ASHP	20	NG	119.3	65.5	2.7	11944.5	7.7	111.6	248.6	-113.2	-5	-2212008.5	118	1
10	60	2	0.1	20	60	0	FC	ASHP	20	NG	118.7	57.6	2.5	11229.3	6.8	111.8	245.5	42.8	1.9	-6052656.3	-38	1
10	40	1.2	0.2	5	60	0	FC	ASHP	20	NG	119.1	63.6	2.6	11748.9	7.5	111.6	247.9	-95.9	-4.2	-2333550.1	100.7	1
10	40	1.6	0.2	5	60	0	FC	ASHP	20	NG	119.2	64.4	2.6	11778.9	7.5	111.7	248.1	-105.1	-4.7	-6021568.9	109.9	1
40	40	2.5	0.2	20	60	0	FC	ASHP	40	NG	118.4	60.7	2.4	10952.2	6.5	111.9	246.8	155.9	6.9	-11780731	-151.2	1
10	60	1.2	0.2	20	60	0	FC	ASHP	40	NG	118.2	58.1	2.4	10702.6	6.2	112	245.7	102.5	4.5	-2202779.6	-97.8	1
7	40	0.8	0.2	20	80	0	FC	ASHP	20	NG	118.5	50.4	2.4	10631.6	6.1	112.4	242.5	184.4	8.2	-1318045.4	-179.9	2
10	60	2	0.2	20	80	0	FC	ASHP	40	NG	117.1	48.9	2.2	9906.6	5.2	111.9	241.1	74.9	3.3	-4068485.5	-70.1	2
10	40	1.6	0.2	20	80	0	FC	ASHP	40	NG	117.4	50.6	2.2	10093.8	5.5	112	242.5	72.8	3.2	-1961115.2	-68.1	2
10	20	0.8	0.1	20	80	0	FC	ASHP	40	NG	117.8	53.3	2.3	10338.4	5.7	112.1	243.7	168.3	7.4	-2926219.1	-163.6	2
7	60	0.8	0.1	20	60	0	FC	ASHP	40	NG	117.7	54.7	2.3	10461.4	5.9	111.8	244.5	187.6	8.3	-289887054.8	-182.8	2
7	40	0.8	0.2	20	80	0	FC	ASHP	40	NG	117.8	50.4	2.2	10065.4	5.4	112.4	242.5	188.7	8.3	-1348577	-184.2	2
10	60	2	0.2	20	80	0	FC	ASHP	20	NG	117.8	48.9	2.3	10472.9	5.9	111.9	241.1	70.6	3.1	-3836445.2	-65.9	2
7	60	0.8	0.1	20	60	0	FC	ASHP	20	NG	118.4	54.7	2.4	11027.6	6.6	111.8	244.5	183.3	8.1	-283286861.9	-178.6	2
10	20	0.8	0.1	20	80	0	FC	ASHP	20	NG	118.5	53.3	2.4	10904.7	6.4	112.1	243.7	164	7.3	-2851933.9	-159.4	2
10	40	1.6	0.2	20	80	0	FC	ASHP	20	NG	118.1	50.6	2.4	10660	6.1	112	242.5	68.6	3	-1846122.8	-63.9	2
40	40	1.2	0.2	5	80	0	RTU	RTU	40	NG	134.8	31.3	5.6	25319.7	23.8	111	243	73.4	3.2	-775555.2	-70.2	3
40	40	1.6	0.2	5	80	0	RTU	RTU	40	NG	135.7	32	5.8	26205.5	24.9	110.8	242.9	64.2	2.8	-1223638.5	-60.9	3
40	40	2	0.2	5	80	0	RTU	RTU	40	NG	136.6	32.6	6	27036.6	25.9	110.7	242.8	58	2.6	-2878146.5	-54.7	3
40	40	0.8	0.2	5	80	0	RTU	RTU	20	NG	134.6	30.6	5.5	24942.3	23.3	111.2	243.1	88.8	3.9	-614676.5	-85.7	3
40	40	0.8	0.2	5	80	0	RTU	RTU	40	NG	133.9	30.6	5.4	24376	22.7	111.2	243.1	93.1	4.1	-644231.3	-89.9	3
40	40	1.2	0.2	5	80	0	RTU	RTU	20	NG	135.5	31.3	5.7	25885.9	24.5	111	243	69.2	3.1	-730443	-66	3
40	40	1.6	0.2	5	80	0	RTU	RTU	20	NG	136.4	32	5.9	26771.7	25.6	110.8	242.9	59.9	2.7	-1142165.7	-56.7	3
40	40	2	0.2	5	80	0	RTU	RTU	20	NG	137.2	32.6	6.1	27602.9	26.6	110.7	242.8	53.7	2.4	-2666058	-50.5	3
40	60	0.8	0.2	20	60	0	RTU	RTU	20	NG	142.8	33.8	6.8	30520.2	29.9	112.9	247.4	278.8	12.3	-552343.5	-277	3
40	60	0.8	0.2	20	60	0	RTU	RTU	40	NG	142.1	33.8	6.7	29954	29.3	112.9	247.4	283	12.5	-560806.5	-281.3	3

Mall Retail - Lowest ICC - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	112.8	38.5	12	53923.8	61.7	51.1	76	-205.4	-6	-23398.8	229.8	1
7	20	2.5	0.2	5	60	0.25	RTU	RTU	20	NG	120.4	33	10.6	47885.3	53.5	66.9	96.7	-205.4	-6	-38976.6	221.8	1
10	20	2	0.2	5	60	0.25	RTU	RTU	20	NG	114.8	30.2	9.8	44348.2	49.3	65.5	93.4	-202.8	-5.9	-36350.7	220.1	1
10	20	2.5	0.2	5	60	0.25	RTU	RTU	20	NG	115.5	30.7	10	44951	50.1	65.5	93.4	-205.4	-6	-36792.9	222.8	1
7	20	2	0.2	5	60	0.25	RTU	RTU	20	NG	119.7	32.6	10.5	47290.6	52.8	66.9	96.7	-202.8	-5.9	-38512.6	219.1	1
7	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	117.6	40.8	12.6	56822.8	65.1	52.5	79.1	-205.4	-6	-24273	228.7	1
4	20	2	0.2	5	60	0.25	RTU	RTU	20	NG	130.3	37.5	11.9	53551.2	60.1	70.1	104	-202.8	-5.9	-44586.2	216.8	1
4	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	134.7	32.2	10.6	47558.3	52.2	82.5	119.2	-205.4	-6	-113913.6	213.3	1
4	20	2	0.2	5	60	0	RTU	RTU	20	NG	134	31.7	10.4	47009.6	51.5	82.5	119.2	-202.8	-5.9	-112537.9	210.7	1
4	20	2.5	0.2	5	60	0.25	RTU	RTU	20	NG	130.9	38	12	54127.1	60.8	70.1	104	-205.4	-6	-45126.8	219.4	1
7	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	115.6	29.8	9.7	43840.4	48.6	67	96.3	-199.9	-5.9	-38113.4	216.5	2
4	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	130.1	29	9.7	43698.5	47.6	82.5	118.5	-199.9	-5.9	-111385.8	208.1	2
7	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	124.1	27.3	9.2	41389.3	45	79.1	111.8	-205.4	-6	-80648.8	215.7	2
10	20	2	0.2	5	60	0	RTU	RTU	20	NG	118.6	24.6	8.4	37884.3	40.9	77.8	108.4	-202.8	-5.9	-71073.6	214.1	2
10	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	114.8	21.8	7.7	34548.8	36.8	77.9	108.2	-199.9	-5.9	-70982	211.4	2
10	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	119.3	25	8.5	38459.8	41.6	77.7	108.5	-205.4	-6	-71903.5	216.7	2
10	20	2.5	0.2	5	60	0	RTU	RTU	40	NG	118.2	25	8.3	37558	40.5	77.7	108.5	-201.7	-5.9	-70603.6	213.1	2
7	20	2	0.2	5	60	0	RTU	RTU	20	NG	123.5	26.9	9.1	40827	44.3	79.2	111.8	-202.8	-5.9	-79682.5	213	2
7	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	119.6	24.2	8.3	37486.5	40.3	79.3	111.3	-199.9	-5.9	-79382	210.4	2
7	20	2.5	0.2	5	60	0	RTU	RTU	40	NG	123	27.3	9	40487.6	43.9	79.1	111.8	-201.7	-5.9	-79190.7	212.1	2
20	20	2.5	0.1	5	60	0	RTU	RTU	40	NG	107.7	18.3	6.5	29219	30.5	77.2	105.6	-177.6	-5.2	-59815.7	190	3
10	40	2.5	0.2	5	60	0	RTU	RTU	40	NG	107.9	18	6.4	28779.6	29.9	78	106.4	-178.4	-5.2	-63792.8	190.4	3
20	20	2	0.1	5	60	0	RTU	RTU	20	NG	108.2	17.8	6.6	29494.4	30.8	77.4	105.7	-178.6	-5.2	-60826.7	190.9	3
10	40	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	99.4	19.7	6.9	31250.6	33.6	65.8	90.9	-176.6	-5.2	-32015.2	195	3
10	40	2.5	0.2	5	60	0	RTU	RTU	20	NG	109	18	6.6	29681.4	31	78	106.4	-182.1	-5.3	-65120.8	194.1	3
10	40	2.5	0.1	5	60	0	RTU	RTU	20	NG	104.7	14.8	5.7	25808	26.3	78.4	106.4	-176.6	-5.2	-65130.8	188.7	3
10	40	2	0.2	5	60	0	RTU	RTU	20	NG	108.4	17.5	6.5	29126	30.3	78	106.3	-179.5	-5.3	-64295	191.4	3
20	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	108.8	18.3	6.7	30120.8	31.6	77.2	105.6	-181.3	-5.3	-61066.8	193.6	3
7	40	2	0.2	5	60	0	RTU	RTU	20	NG	113.2	19.8	7.1	32032	33.7	79.4	109.5	-179.5	-5.3	-72257.3	190.4	3
7	40	2.5	0.1	5	60	0	RTU	RTU	20	NG	109.4	17.2	6.4	28807.3	29.9	79.6	109.3	-176.6	-5.2	-72108	187.8	3

Mall Retail - Lowest ICC - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	1.6	0.1	5	60	0.5	RTU	RTU	40	NG	128.4	44.7	13.2	59286.5	67.6	60.8	141.2	-212.9	-6.2	-22916.7	235.1	1
10	20	2	0.1	5	60	0.5	RTU	RTU	40	NG	129	45.1	13.3	59805.9	68.2	60.8	141.2	-218	-6.4	-23480.5	240.1	1
10	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	130.9	45.6	13.6	61331.7	70	60.9	141.3	-224.1	-6.6	-24149	246	1
20	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	128.9	45.8	13.6	61426.3	70.3	58.7	139.7	-213.7	-6.3	-21884.1	236.8	1
10	20	1.6	0.1	5	60	0.5	RTU	RTU	20	NG	129.5	44.7	13.4	60188.3	68.6	60.8	141.2	-216.4	-6.3	-23296.5	238.5	1
20	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	128.1	45.3	13.5	60808.2	69.5	58.6	139.6	-211.2	-6.2	-21576.4	234.4	1
10	20	1.6	0.1	5	60	0.25	RTU	RTU	40	NG	132.3	38.4	11.6	52122	58.2	74.1	153.5	-212.9	-6.2	-33620.7	228.5	1
10	20	2.5	0.1	5	60	0.5	RTU	RTU	40	NG	129.8	45.6	13.4	60429.9	68.9	60.9	141.3	-220.6	-6.5	-23768.8	242.6	1
10	20	2	0.1	5	60	0.5	RTU	RTU	20	NG	130.1	45.1	13.5	60707.7	69.3	60.8	141.2	-221.6	-6.5	-23860.5	243.6	1
20	20	2	0.2	5	60	0.25	RTU	RTU	20	NG	131.8	38.9	11.9	53515.4	60	71.9	151.8	-211.2	-6.2	-30868.6	227.9	1
7	20	2.5	0.2	5	80	0	RTU	RTU	40	NG	129.4	25.5	8.2	36975.1	39	90.4	166.9	-197.6	-5.8	-72704.6	205.7	2
10	20	2.5	0.2	5	80	0.25	RTU	RTU	40	NG	116.9	27	8.5	38180	41.3	75.5	153.9	-197.6	-5.8	-32775.5	213.7	2
10	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	108.2	29	6.5	29434.4	30.7	77.5	154.5	-197.9	-5.8	-35422.4	213.8	2
10	20	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	117.9	27	8.7	39081.8	42.4	75.5	153.9	-201.1	-5.9	-33360.8	217.1	2
10	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	108	29	5.8	26031.1	26.4	81.6	154.5	-197.9	-5.8	-42346.7	211.8	2
7	20	2.5	0.2	5	80	0	RTU	RTU	20	NG	130.5	25.5	8.4	37876.9	40.1	90.4	166.9	-201.1	-5.9	-74003.1	209.1	2
10	40	2.5	0.1	5	60	0	RTU	RTU	20	NG	125.5	24.9	8.2	36939.2	39.2	86.3	164.8	-202	-5.9	-55449.7	212.4	2
7	20	2	0.2	5	80	0	RTU	RTU	20	NG	129.8	25	8.3	37332	39.4	90.4	166.9	-198.5	-5.8	-72809.5	206.7	2
7	40	2	0.1	5	60	0	RTU	RTU	20	NG	130.8	27.3	8.9	40021.8	42.8	88	166.1	-199.4	-5.8	-61245.7	208.6	2
10	20	2	0.2	5	80	0.25	RTU	RTU	20	NG	117.2	26.6	8.6	38505.9	41.7	75.5	153.9	-198.5	-5.8	-32898	214.6	2
10	40	2	0.1	5	60	0	RTU	RTU	40	NG	123.7	24.4	7.9	35432.7	37.4	86.3	164.8	-195.9	-5.7	-53890.7	206.4	3
10	40	2.5	0.1	5	60	0	RTU	RTU	40	NG	124.4	24.9	8	36037.4	38.1	86.3	164.8	-198.4	-5.8	-54481	208.9	3
10	20	2.5	0.2	5	80	0	RTU	RTU	40	NG	123.3	22.9	7.5	33668.3	35.2	88.1	165.2	-197.6	-5.8	-61187.9	207.2	3
10	20	2.5	0.2	5	80	0	RTU	RTU	20	NG	124.4	22.9	7.7	34570	36.3	88.1	165.2	-201.1	-5.9	-62280.6	210.7	3
10	20	2.5	0.1	5	80	0	RTU	RTU	20	NG	119.1	19.4	6.7	30225.9	31.1	88.1	165.1	-195.8	-5.7	-60437.3	205.8	3
10	20	2	0.2	5	80	0	RTU	RTU	20	NG	123.7	22.5	7.6	34007.4	35.6	88.1	165.2	-198.5	-5.8	-61399.4	208.2	3
10	40	2	0.1	5	60	0	RTU	RTU	20	NG	124.8	24.4	8.1	36334.4	38.5	86.3	164.8	-199.4	-5.8	-54861.4	209.8	3
10	40	1.6	0.1	5	60	0	RTU	RTU	20	NG	124.2	24	8	35830.2	37.9	86.3	164.8	-194.3	-5.7	-53537.6	204.8	3
10	20	2	0.2	5	80	0	RTU	RTU	40	NG	122.6	22.5	7.4	33105.6	34.5	88.1	165.2	-195	-5.7	-60308.2	204.8	3
10	20	2.5	0.1	5	80	0.25	RTU	RTU	20	NG	112.4	23.5	7.7	34741.7	37.2	75.2	153.5	-195.8	-5.7	-32107.8	212.4	3

Mall Retail - Lowest ICC - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.2	5	80	0	FC	Condensing	40	Elec	121.2	48.6	8.4	37973.1	40.8	80.4	241.4	-253.3	-7.4	-54536.6	267.6	1
10	20	2	0.2	5	80	0	FC	Condensing	20	Elec	121.7	47.9	8.3	37517.7	40.2	81.5	241.4	-254.4	-7.4	-57766.8	268.3	1
10	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	122.3	48.6	8.4	38026.7	40.8	81.5	241.4	-257.5	-7.5	-58484.7	271.3	1
10	20	2.5	0.2	5	80	0	FC	Condensing	40	NG	121.2	48.6	9	40517.5	44.1	77.1	241.4	-253.3	-7.4	-47203.9	269.2	1
7	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	123.4	48.7	9.3	41946.5	45.7	77.6	241.6	-251.1	-7.4	-47732.4	266.7	1
10	20	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	112.1	48.7	9.2	41382.6	45.7	66.4	231.6	-251.1	-7.4	-32369.4	272.8	1
20	40	2.5	0.2	5	60	0	FC	Condensing	20	Elec	121.5	48.9	8.6	38778.2	41.8	79.7	240.4	-251.1	-7.4	-52269.2	265.8	1
10	20	2	0.2	5	80	0	FC	Condensing	20	NG	121.7	47.9	9.1	40910.2	44.5	77.1	241.4	-254.4	-7.4	-47413.1	270.3	1
20	40	2.5	0.2	5	60	0	FC	Condensing	20	NG	121.5	48.9	9.4	42170.7	46.1	75.3	240.4	-251.1	-7.4	-43551.4	267.9	1
10	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	122.3	48.6	9.2	41419.3	45.1	77.1	241.4	-257.5	-7.5	-48000.1	273.3	1
10	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	117.2	43.5	8.3	37193.8	40.1	77.1	241	-251.1	-7.4	-46793.9	267.3	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	117	43.8	7.8	34981	37.3	79.7	240	-244.8	-7.2	-51080.8	259.8	2
10	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	116.1	43.5	7.5	33747.7	35.7	80.4	241	-246.9	-7.2	-53140.5	261.6	2
10	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	116.1	43.5	8.1	36292.1	39	77.1	241	-246.9	-7.2	-45998	263.2	2
10	20	2	0.1	5	80	0	FC	Condensing	40	NG	115.5	42.8	7.9	35784.4	38.4	77.2	241	-243.8	-7.1	-45442.9	260.1	2
10	20	2	0.1	5	80	0	FC	Condensing	20	NG	116.6	42.8	8.1	36686.1	39.5	77.2	241	-248	-7.3	-46239.1	264.3	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	117	43.8	8.5	38373.5	41.6	75.4	240	-244.8	-7.2	-42541.6	261.8	2
10	20	2	0.1	5	80	0	FC	Condensing	40	Elec	115.5	42.8	7.4	33240	35.1	80.4	241	-243.8	-7.1	-52503	258.6	2
10	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	117.2	43.5	7.5	33801.3	35.7	81.5	241	-251.1	-7.4	-57010.8	265.3	2
10	20	2	0.1	5	80	0	FC	Condensing	20	Elec	116.6	42.8	7.4	33293.6	35.1	81.5	241	-248	-7.3	-56340.7	262.3	2
20	40	2	0.2	5	80	0	FC	Condensing	20	Elec	102.6	28.5	4.7	21280.2	20.7	81.9	238.3	-213.8	-6.3	-49648.4	228.9	3
10	40	1.6	0.1	5	80	0	FC	Condensing	20	NG	104.6	29.8	5.8	25909.6	26.5	78.1	238.9	-215.1	-6.3	-41781	231.8	3
10	40	1.6	0.1	5	80	0	FC	Condensing	40	NG	103.5	29.8	5.6	25007.8	25.4	78.1	238.9	-210.8	-6.2	-40951.2	227.6	3
10	40	1.6	0.1	5	80	0	FC	Condensing	20	Elec	104.6	29.8	5	22517	22.1	82.5	238.9	-215.1	-6.3	-51381.9	229.7	3
20	40	2.5	0.2	5	80	0	FC	Condensing	40	NG	102	29.2	5.4	24173.9	24.4	77.6	238.5	-212.6	-6.2	-40320	229.8	3
10	40	1.6	0.1	5	80	0	FC	Condensing	40	Elec	103.5	29.8	5	22463.4	22.1	81.4	238.9	-210.8	-6.2	-47625.4	226	3
20	40	2	0.2	5	80	0	FC	Condensing	20	NG	102.6	28.5	5.5	24672.7	25	77.6	238.3	-213.8	-6.3	-40584.3	230.9	3
20	40	2.5	0.2	5	80	0	FC	Condensing	20	NG	103.1	29.2	5.6	25075.6	25.5	77.6	238.5	-216.9	-6.3	-41129.9	234	3
20	40	2.5	0.2	5	80	0	FC	Condensing	20	Elec	103.1	29.2	4.8	21683.1	21.2	81.9	238.5	-216.9	-6.3	-50304.5	232	3
20	40	2.5	0.2	5	80	0	FC	Condensing	40	Elec	102	29.2	4.8	21629.5	21.2	80.8	238.5	-212.6	-6.2	-46709.1	228.3	3

Mall Retail - Lowest ICC - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	145.6	70	11	49514.3	54	91.6	261.5	-149.4	-4.4	-70758.3	157.6	1
20	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	142.6	67.7	9.8	44340.4	47.6	95	261.3	-143.4	-4.2	-107131.1	150.1	1
10	20	2	0.1	5	80	0	FC	Condensing	20	Elec	144.5	69.2	10.1	45387.4	48.8	95.7	261.4	-146.3	-4.3	-122291	152.6	1
10	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	145.3	70	10.2	46111.1	49.7	95.7	261.5	-149.4	-4.4	-124761.8	155.7	1
10	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	144.5	70	10.8	48612.6	52.9	91.6	261.5	-145.1	-4.2	-68734.9	153.4	1
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	141.9	67.6	10.7	47963.8	52.3	89.6	261	-144.4	-4.2	-56753.2	153.8	1
20	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	142.8	67.7	10.6	47743.6	51.9	90.9	261.3	-143.4	-4.2	-63661.2	152.1	1
10	20	2	0.1	5	80	0	FC	Condensing	20	NG	144.7	69.2	10.8	48790.7	53.1	91.6	261.4	-146.3	-4.3	-69329.2	154.5	1
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	141.6	67.6	9.9	44560.5	47.9	93.7	261	-144.4	-4.2	-88548.3	151.9	1
10	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	144.3	70	10.2	46060.1	49.7	94.6	261.5	-145.1	-4.2	-101775	151.9	1
10	40	2.5	0.1	5	80	0	RTU	RTU	40	NG	147.6	47.9	9.6	43392.5	46.1	101.6	270.3	-122.1	-3.6	293609.3	124.7	2
20	40	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	139.9	50.7	10.5	47236.4	51.4	88.5	258.5	-120.4	-3.5	-48402.7	129.7	2
10	40	2	0.1	5	80	0.25	RTU	RTU	20	NG	142.6	52.1	10.9	48930	53.4	89.2	258.8	-123.3	-3.6	-52834.8	132.1	2
10	40	2.5	0.1	5	80	0.25	RTU	RTU	20	NG	143.8	52.8	11.1	49879.2	54.6	89.3	258.9	-126.4	-3.7	-54695.6	135.1	2
10	40	2.5	0.1	5	80	0.25	RTU	RTU	40	NG	142.8	52.8	10.9	48977.5	53.5	89.3	258.9	-122.1	-3.6	-52847.2	130.9	2
20	40	2.5	0.2	5	80	0	RTU	RTU	20	NG	144.9	45.9	9.3	41772.3	44.2	100.7	269.8	-120.4	-3.5	507872.5	123.6	2
10	40	2	0.1	5	80	0	RTU	RTU	20	NG	147.5	47.1	9.6	43352.8	46	101.5	270.2	-123.3	-3.6	308190.1	125.9	2
10	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	148.7	47.9	9.8	44294.3	47.1	101.6	270.3	-126.4	-3.7	303878.4	128.9	2
10	40	2.5	0.1	5	80	0	FC	Condensing	20	Elec	130.3	54.6	7.3	33081.3	34	96.3	260.1	-122.6	-3.6	-114860.1	129.7	2
10	40	2.5	0.1	5	80	0	FC	Condensing	20	NG	130.5	54.6	8.1	36484.5	38.3	92.1	260.1	-122.6	-3.6	-61877.8	131.7	2
20	60	2.5	0.1	5	80	0	RTU	RTU	20	NG	129.9	36.8	6.7	30361.6	30.5	99.4	268.3	-87.2	-2.6	-1235534.1	92.2	3
20	40	1.2	0.1	5	80	0	RTU	RTU	20	NG	132.9	38.4	7.2	32403.1	33	99.9	268.9	-95.4	-2.8	1684182.3	99.9	3
20	40	1.6	0.1	5	80	0	RTU	RTU	20	NG	133.9	39.1	7.4	33273	34	99.9	268.9	-104.7	-3.1	2142643.8	109.1	3
20	60	2	0.1	5	80	0	RTU	RTU	40	NG	127.7	36.1	6.3	28511.7	28.3	99.4	268.3	-79.8	-2.3	-1145602.4	85	3
20	40	2	0.1	5	80	0	RTU	RTU	40	NG	133.8	39.7	7.4	33184.3	33.9	99.9	268.9	-106.6	-3.1	2170150.2	111.1	3
20	40	1.6	0.1	5	80	0	RTU	RTU	40	NG	132.8	39.1	7.2	32371.2	32.9	99.9	268.9	-100.4	-2.9	2055249.2	104.9	3
20	40	1.2	0.1	5	80	0	RTU	RTU	40	NG	131.8	38.4	7	31501.4	31.9	99.9	268.9	-91.2	-2.7	1608807.7	95.7	3
20	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	128.8	36.8	6.5	29459.9	29.5	99.4	268.3	-82.9	-2.4	-1175017.5	88	3
20	60	2	0.1	5	80	0	RTU	RTU	20	NG	128.8	36.1	6.5	29413.5	29.4	99.4	268.3	-84.1	-2.5	-1206890.1	89.2	3
20	40	2	0.1	5	80	0	RTU	RTU	20	NG	134.9	39.7	7.6	34086.1	35	99.9	268.9	-110.9	-3.2	2257076.6	115.2	3

Mall Retail - Highest NPV - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	94.1	41.5	8.2	36747.8	41	53.1	74.5	-202.1	-5.9	-23624.7	227.5	1
7	20	2.5	0.2	5	60	0.5	FC	Condensing	20	Elec	97.6	44.6	8.7	39291.6	44	53.6	76.6	-202.1	-5.9	-23924	227	1
10	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	112	38	11.8	53287.2	60.9	51.1	75.8	-202.8	-5.9	-23110.3	227.1	1
10	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	112.8	38.5	12	53923.8	61.7	51.1	76	-205.4	-6	-23398.8	229.8	1
7	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	117.6	40.8	12.6	56822.8	65.1	52.5	79.1	-205.4	-6	-24273	228.7	1
10	20	2	0.2	5	60	0.5	FC	Condensing	20	NG	93.8	41	8.8	39782.2	44.8	49	74.5	-199.4	-5.8	-21059	226.7	1
10	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	94.3	41.5	8.9	40151.1	45.3	49	74.5	-202.1	-5.9	-21345	229.4	1
7	20	2	0.2	5	60	0.5	FC	Condensing	20	NG	97.4	44.1	9.4	42368.7	47.9	49.5	76.7	-199.4	-5.8	-21303.8	226.2	1
7	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	97.8	44.6	9.5	42694.9	48.3	49.5	76.6	-202.1	-5.9	-21589	228.9	1
4	20	2.5	0.2	5	60	0.5	FC	Condensing	20	NG	105.8	51.2	10.8	48424.7	55.1	50.7	81	-202.1	-5.9	-22212	227.7	1
10	20	2.5	0.1	5	60	0.25	RTU	RTU	40	NG	109.7	27.4	8.9	39967.2	44.1	65.6	93.3	-196.2	-5.7	-35380	213.9	2
10	20	2.5	0.2	5	60	0	RTU	RTU	40	NG	118.2	25	8.3	37558	40.5	77.7	108.5	-201.7	-5.9	-70603.6	213.1	2
10	20	1.6	0.2	5	60	0.25	RTU	RTU	20	NG	114.3	29.8	9.7	43862.1	48.8	65.5	93.4	-197.4	-5.8	-35411	214.8	2
10	20	2	0.1	5	60	0.25	RTU	RTU	20	NG	110.1	26.9	8.9	40280.8	44.5	65.7	93.3	-197.2	-5.8	-35606.6	214.9	2
10	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	110.8	27.4	9.1	40868.9	45.2	65.6	93.3	-199.9	-5.9	-36049.9	217.5	2
7	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	124.1	27.3	9.2	41389.3	45	79.1	111.8	-205.4	-6	-80648.8	215.7	2
7	20	2	0.1	5	60	0.25	RTU	RTU	20	NG	115	29.3	9.6	43258.7	47.9	67	96.3	-197.2	-5.8	-37644.8	213.9	2
7	20	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	115.6	29.8	9.7	43840.4	48.6	67	96.3	-199.9	-5.9	-38113.4	216.5	2
10	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	119.3	25	8.5	38459.8	41.6	77.7	108.5	-205.4	-6	-71903.5	216.7	2
10	20	2	0.2	5	60	0	RTU	RTU	20	NG	118.6	24.6	8.4	37884.3	40.9	77.8	108.4	-202.8	-5.9	-71073.6	214.1	2
10	40	2.5	0.1	5	60	0.25	RTU	RTU	20	NG	99.4	19.7	6.9	31250.6	33.6	65.8	90.9	-176.6	-5.2	-32015.2	195	3
10	40	2.5	0.2	5	60	0	RTU	RTU	20	NG	109	18	6.6	29681.4	31	78	106.4	-182.1	-5.3	-65120.8	194.1	3
10	40	2	0.2	5	60	0	RTU	RTU	20	NG	108.4	17.5	6.5	29126	30.3	78	106.3	-179.5	-5.3	-64295	191.4	3
10	20	2	0.1	5	80	0.5	RTU	RTU	20	NG	85.6	19.3	6.7	30203.9	33.1	52.5	74.5	-167.4	-4.9	-19757.2	193.2	3
10	40	2	0.1	5	60	0.25	RTU	RTU	20	NG	98.7	19.2	6.8	30679.5	32.9	65.8	90.9	-173.9	-5.1	-31567.9	192.4	3
7	20	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	101.8	19.5	6.9	31237	33.4	68.4	95.6	-175.7	-5.1	-35623.4	192.7	3
10	20	2.5	0.1	5	80	0.5	RTU	RTU	20	NG	86.2	19.8	6.8	30784.4	33.8	52.4	74.5	-170.1	-5	-20046.8	195.8	3
10	20	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	97.1	17.3	6.3	28373.9	30.1	67	92.4	-175.7	-5.1	-33468.7	193.7	3
20	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	108.8	18.3	6.7	30120.8	31.6	77.2	105.6	-181.3	-5.3	-61066.8	193.6	3
10	20	2.5	0.1	5	80	0.5	RTU	RTU	40	NG	85.2	19.8	6.6	29882.6	32.8	52.4	74.5	-166.4	-4.9	-19609.1	192.2	3

Mall Retail - Highest NPV - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	130.9	45.6	13.6	61331.7	70	60.9	141.3	-224.1	-6.6	-24149	246	1
10	20	2	0.1	5	60	0.5	RTU	RTU	20	NG	130.1	45.1	13.5	60707.7	69.3	60.8	141.2	-221.6	-6.5	-23860.5	243.6	1
10	20	1.6	0.1	5	60	0.5	RTU	RTU	20	NG	129.5	44.7	13.4	60188.3	68.6	60.8	141.2	-216.4	-6.3	-23296.5	238.5	1
20	20	2.5	0.2	5	60	0.5	RTU	RTU	20	NG	128.9	45.8	13.6	61426.3	70.3	58.7	139.7	-213.7	-6.3	-21884.1	236.8	1
20	20	2.5	0.2	5	60	0.5	RTU	RTU	40	NG	127.9	45.8	13.4	60524.5	69.2	58.7	139.7	-210.2	-6.2	-21522.8	233.4	1
10	20	1.6	0.1	5	60	0.5	RTU	RTU	40	NG	128.4	44.7	13.2	59286.5	67.6	60.8	141.2	-212.9	-6.2	-22916.7	235.1	1
10	20	2.5	0.1	5	60	0.5	RTU	RTU	40	NG	129.8	45.6	13.4	60429.9	68.9	60.9	141.3	-220.6	-6.5	-23768.8	242.6	1
10	20	2	0.1	5	60	0.5	RTU	RTU	40	NG	129	45.1	13.3	59805.9	68.2	60.8	141.2	-218	-6.4	-23480.5	240.1	1
20	20	2.5	0.1	5	60	0.5	RTU	RTU	20	NG	123	42.1	12.6	56810	64.7	58.2	139.2	-208.4	-6.1	-21118.1	232.2	1
20	20	2	0.2	5	60	0.5	RTU	RTU	20	NG	128.1	45.3	13.5	60808.2	69.5	58.6	139.6	-211.2	-6.2	-21576.4	234.4	1
10	20	2.5	0.2	5	80	0.25	RTU	RTU	40	NG	116.9	27	8.5	38180	41.3	75.5	153.9	-197.6	-5.8	-32775.5	213.7	2
10	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	108.2	29	6.5	29434.4	30.7	77.5	154.5	-197.9	-5.8	-35422.4	213.8	2
10	20	2	0.2	5	80	0.25	RTU	RTU	20	NG	117.2	26.6	8.6	38505.9	41.7	75.5	153.9	-198.5	-5.8	-32898	214.6	2
10	20	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	117.9	27	8.7	39081.8	42.4	75.5	153.9	-201.1	-5.9	-33360.8	217.1	2
10	20	2	0.2	5	80	0	FC	Condensing	20	NG	107.9	28.5	6.5	29167.7	30.4	77.5	154.5	-195.4	-5.7	-35004.4	211.2	2
10	40	2.5	0.1	5	60	0	RTU	RTU	20	NG	125.5	24.9	8.2	36939.2	39.2	86.3	164.8	-202	-5.9	-55449.7	212.4	2
10	20	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	97.4	29.3	6.5	29171.9	31.1	66.3	145	-192.7	-5.6	-23866.7	214.6	2
10	20	2.5	0.1	5	80	0.25	FC	Condensing	20	Elec	97.2	29.3	5.7	25768.6	26.7	70.4	145	-192.7	-5.6	-26913	212.7	2
10	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	108	29	5.8	26031.1	26.4	81.6	154.5	-197.9	-5.8	-42346.7	211.8	2
10	20	2	0.1	5	80	0.25	FC	Condensing	20	NG	96.9	28.8	6.4	28725.7	30.5	66.3	144.9	-190.1	-5.6	-23559.1	212.1	2
10	20	2	0.1	5	80	0.25	RTU	RTU	40	NG	110.7	23.1	7.4	33270.1	35.5	75.2	153.5	-189.7	-5.6	-31097.5	206.5	3
10	20	2.5	0.1	5	80	0.25	RTU	RTU	40	NG	111.3	23.5	7.5	33840	36.2	75.2	153.5	-192.3	-5.6	-31529.3	209	3
10	20	2.5	0.2	5	80	0	RTU	RTU	40	NG	123.3	22.9	7.5	33668.3	35.2	88.1	165.2	-197.6	-5.8	-61187.9	207.2	3
10	40	2.5	0.1	5	60	0	RTU	RTU	40	NG	124.4	24.9	8	36037.4	38.1	86.3	164.8	-198.4	-5.8	-54481	208.9	3
10	20	2	0.1	5	80	0.25	RTU	RTU	20	NG	111.7	23.1	7.6	34171.8	36.6	75.2	153.5	-193.3	-5.7	-31675.8	209.9	3
10	20	2.5	0.2	5	80	0	RTU	RTU	20	NG	124.4	22.9	7.7	34570	36.3	88.1	165.2	-201.1	-5.9	-62280.6	210.7	3
10	20	2	0.2	5	80	0	RTU	RTU	20	NG	123.7	22.5	7.6	34007.4	35.6	88.1	165.2	-198.5	-5.8	-61399.4	208.2	3
10	40	2	0.1	5	60	0	RTU	RTU	20	NG	124.8	24.4	8.1	36334.4	38.5	86.3	164.8	-199.4	-5.8	-54861.4	209.8	3
10	40	2	0.1	5	60	0	RTU	RTU	40	NG	123.7	24.4	7.9	35432.7	37.4	86.3	164.8	-195.9	-5.7	-53890.7	206.4	3
10	20	2.5	0.1	5	80	0.25	RTU	RTU	20	NG	112.4	23.5	7.7	34741.7	37.2	75.2	153.5	-195.8	-5.7	-32107.8	212.4	3

Mall Retail - Highest NPV - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	122.3	48.6	9.2	41419.3	45.1	77.1	241.4	-257.5	-7.5	-48000.1	273.3	1
10	20	2.5	0.1	5	80	0.25	FC	Condensing	20	Elec	112.1	48.7	8.4	37990.1	41.4	70.7	231.6	-251.1	-7.4	-36950.1	270.8	1
10	20	2	0.2	5	80	0	FC	Condensing	20	Elec	121.7	47.9	8.3	37517.7	40.2	81.5	241.4	-254.4	-7.4	-57766.8	268.3	1
10	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	122.3	48.6	8.4	38026.7	40.8	81.5	241.4	-257.5	-7.5	-58484.7	271.3	1
10	20	2.5	0.1	5	80	0.25	FC	Condensing	40	NG	111	48.7	9	40480.8	44.7	66.4	231.6	-246.9	-7.2	-31818.9	268.6	1
10	20	2.5	0.2	5	80	0	FC	Condensing	40	NG	121.2	48.6	9	40517.5	44.1	77.1	241.4	-253.3	-7.4	-47203.9	269.2	1
10	20	2	0.1	5	80	0.25	FC	Condensing	20	NG	111.5	48	9.1	40821.3	45.1	66.4	231.5	-248	-7.3	-32005.5	269.7	1
10	20	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	112.1	48.7	9.2	41382.6	45.7	66.4	231.6	-251.1	-7.4	-32369.4	272.8	1
10	20	2	0.2	5	80	0	FC	Condensing	20	NG	121.7	47.9	9.1	40910.2	44.5	77.1	241.4	-254.4	-7.4	-47413.1	270.3	1
20	40	2.5	0.2	5	60	0	FC	Condensing	20	NG	121.5	48.9	9.4	42170.7	46.1	75.3	240.4	-251.1	-7.4	-43551.4	267.9	1
20	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	115.1	41.7	8	35819.1	38.4	76.6	240.7	-243.7	-7.1	-44426.1	260.3	2
10	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	117.2	43.5	8.3	37193.8	40.1	77.1	241	-251.1	-7.4	-46793.9	267.3	2
10	20	2	0.1	5	80	0	FC	Condensing	20	NG	116.6	42.8	8.1	36686.1	39.5	77.2	241	-248	-7.3	-46239.1	264.3	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	117	43.8	7.8	34981	37.3	79.7	240	-244.8	-7.2	-51080.8	259.8	2
10	20	2	0.1	5	80	0	FC	Condensing	20	Elec	116.6	42.8	7.4	33293.6	35.1	81.5	241	-248	-7.3	-56340.7	262.3	2
10	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	117.2	43.5	7.5	33801.3	35.7	81.5	241	-251.1	-7.4	-57010.8	265.3	2
10	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	116.1	43.5	7.5	33747.7	35.7	80.4	241	-246.9	-7.2	-53140.5	261.6	2
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	117	43.8	8.5	38373.5	41.6	75.4	240	-244.8	-7.2	-42541.6	261.8	2
10	20	2	0.1	5	80	0	FC	Condensing	40	NG	115.5	42.8	7.9	35784.4	38.4	77.2	241	-243.8	-7.1	-45442.9	260.1	2
10	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	116.1	43.5	8.1	36292.1	39	77.1	241	-246.9	-7.2	-45998	263.2	2
20	40	2	0.1	5	80	0.25	FC	Condensing	20	NG	92	28.2	5.4	24497.4	25.5	66.6	228.8	-207.4	-6.1	-26889	230.5	3
20	40	2.5	0.1	5	80	0.25	FC	Condensing	40	NG	91.4	28.9	5.3	24015.2	24.9	66.6	228.8	-206.2	-6	-26724	229.4	3
10	40	1.6	0.1	5	80	0	FC	Condensing	20	NG	104.6	29.8	5.8	25909.6	26.5	78.1	238.9	-215.1	-6.3	-41781	231.8	3
10	40	1.6	0.1	5	80	0	FC	Condensing	20	Elec	104.6	29.8	5	22517	22.1	82.5	238.9	-215.1	-6.3	-51381.9	229.7	3
20	40	2.5	0.2	5	80	0	FC	Condensing	20	Elec	103.1	29.2	4.8	21683.1	21.2	81.9	238.5	-216.9	-6.3	-50304.5	232	3
20	40	2.5	0.2	5	80	0	FC	Condensing	40	NG	102	29.2	5.4	24173.9	24.4	77.6	238.5	-212.6	-6.2	-40320	229.8	3
20	40	2.5	0.1	5	80	0.25	FC	Condensing	20	Elec	92.5	28.9	4.8	21524.4	21.6	70.9	228.8	-210.5	-6.2	-31160.8	231.6	3
20	40	2	0.2	5	80	0	FC	Condensing	20	NG	102.6	28.5	5.5	24672.7	25	77.6	238.3	-213.8	-6.3	-40584.3	230.9	3
20	40	2.5	0.2	5	80	0	FC	Condensing	20	NG	103.1	29.2	5.6	25075.6	25.5	77.6	238.5	-216.9	-6.3	-41129.9	234	3
20	40	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	92.5	28.9	5.5	24916.9	26	66.6	228.8	-210.5	-6.2	-27277.4	233.6	3

Mall Retail - Highest NPV - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
10	20	2.5	0.1	5	80	0	FC	Condensing	40	Elec	144.3	70	10.2	46060.1	49.7	94.6	261.5	-145.1	-4.2	-101775	151.9	1
20	40	2.5	0.1	5	60	0	FC	Condensing	20	Elec	141.6	67.6	9.9	44560.5	47.9	93.7	261	-144.4	-4.2	-88548.3	151.9	1
10	20	2	0.1	5	80	0	FC	Condensing	20	Elec	144.5	69.2	10.1	45387.4	48.8	95.7	261.4	-146.3	-4.3	-122291	152.6	1
10	20	2.5	0.1	5	80	0	FC	Condensing	20	Elec	145.3	70	10.2	46111.1	49.7	95.7	261.5	-149.4	-4.4	-124761.8	155.7	1
10	20	2.5	0.1	5	80	0	FC	Condensing	20	NG	145.6	70	11	49514.3	54	91.6	261.5	-149.4	-4.4	-70758.3	157.6	1
20	20	2.5	0.1	5	80	0.25	FC	Condensing	20	NG	131.5	67	10.4	46674.9	51.3	80.2	251.5	-137	-4	-29552.5	151.6	1
20	40	2.5	0.1	5	60	0	FC	Condensing	20	NG	141.9	67.6	10.7	47963.8	52.3	89.6	261	-144.4	-4.2	-56753.2	153.8	1
20	20	2.5	0.2	5	80	0	FC	Condensing	20	NG	142.8	67.7	10.6	47743.6	51.9	90.9	261.3	-143.4	-4.2	-63661.2	152.1	1
10	20	2	0.1	5	80	0	FC	Condensing	20	NG	144.7	69.2	10.8	48790.7	53.1	91.6	261.4	-146.3	-4.3	-69329.2	154.5	1
10	20	2.5	0.1	5	80	0	FC	Condensing	40	NG	144.5	70	10.8	48612.6	52.9	91.6	261.5	-145.1	-4.2	-68734.9	153.4	1
20	40	2	0.1	5	80	0.5	RTU	RTU	20	NG	125.6	51.3	10.5	47285.7	52.4	73.2	244.4	-110.9	-3.2	-18877.8	128.5	2
20	40	2.5	0.1	5	80	0.5	RTU	RTU	20	NG	126.9	52.1	10.7	48280.3	53.6	73.3	244.5	-114	-3.3	-19467.4	131.5	2
10	40	2.5	0.1	5	80	0	FC	Condensing	20	NG	130.5	54.6	8.1	36484.5	38.3	92.1	260.1	-122.6	-3.6	-61877.8	131.7	2
20	40	2.5	0.2	5	80	0.25	RTU	RTU	20	NG	139.9	50.7	10.5	47236.4	51.4	88.5	258.5	-120.4	-3.5	-48402.7	129.7	2
10	40	2	0.1	5	80	0.25	RTU	RTU	20	NG	142.6	52.1	10.9	48930	53.4	89.2	258.8	-123.3	-3.6	-52834.8	132.1	2
10	40	2.5	0.1	5	80	0.25	RTU	RTU	20	NG	143.8	52.8	11.1	49879.2	54.6	89.3	258.9	-126.4	-3.7	-54695.6	135.1	2
10	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	148.7	47.9	9.8	44294.3	47.1	101.6	270.3	-126.4	-3.7	303878.4	128.9	2
10	40	2	0.1	5	80	0	FC	Condensing	20	NG	129.3	53.8	7.9	35504.8	37.1	92.2	260.1	-119.5	-3.5	-60411.2	128.6	2
10	40	2.5	0.1	5	80	0	FC	Condensing	20	Elec	130.3	54.6	7.3	33081.3	34	96.3	260.1	-122.6	-3.6	-114860.1	129.7	2
10	40	2.5	0.1	5	80	0.25	RTU	RTU	40	NG	142.8	52.8	10.9	48977.5	53.5	89.3	258.9	-122.1	-3.6	-52847.2	130.9	2
20	60	2	0.1	5	80	0	RTU	RTU	20	NG	128.8	36.1	6.5	29413.5	29.4	99.4	268.3	-84.1	-2.5	-1206890.1	89.2	3
20	40	1.2	0.1	5	80	0	RTU	RTU	20	NG	132.9	38.4	7.2	32403.1	33	99.9	268.9	-95.4	-2.8	1684182.3	99.9	3
20	40	1.6	0.1	5	80	0	RTU	RTU	20	NG	133.9	39.1	7.4	33273	34	99.9	268.9	-104.7	-3.1	2142643.8	109.1	3
20	40	2	0.1	5	80	0	RTU	RTU	20	NG	134.9	39.7	7.6	34086.1	35	99.9	268.9	-110.9	-3.2	2257076.6	115.2	3
20	60	1.6	0.1	5	80	0.25	RTU	RTU	20	NG	121.2	39.6	7.4	33229.2	34.8	86.5	256.5	-77.9	-2.3	-26574.9	89.6	3
20	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	128.8	36.8	6.5	29459.9	29.5	99.4	268.3	-82.9	-2.4	-1175017.5	88	3
20	40	2	0.1	5	80	0	RTU	RTU	40	NG	133.8	39.7	7.4	33184.3	33.9	99.9	268.9	-106.6	-3.1	2170150.2	111.1	3
20	40	1.6	0.1	5	80	0	RTU	RTU	40	NG	132.8	39.1	7.2	32371.2	32.9	99.9	268.9	-100.4	-2.9	2055249.2	104.9	3
20	40	1.2	0.1	5	80	0	RTU	RTU	40	NG	131.8	38.4	7	31501.4	31.9	99.9	268.9	-91.2	-2.7	1608807.7	95.7	3
20	60	2.5	0.1	5	80	0	RTU	RTU	20	NG	129.9	36.8	6.7	30361.6	30.5	99.4	268.3	-87.2	-2.6	-1235534.1	92.2	3

Mall Retail - Lowest Cost of GHG Abatement - CZ4

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	1.2	0.2	5	60	0	RTU	RTU	20	NG	133	31	10.2	46110.7	50.5	82.5	119.2	-189.3	-5.5	-105185.1	197.3	1
4	20	2.5	0.2	20	60	0	RTU	RTU	20	NG	137.5	30.8	10.3	46171	50.2	87.3	128.7	-107.1	-3.1	-144808.9	112.5	1
4	20	1.2	0.2	5	60	0	RTU	RTU	40	NG	131.9	31	10	45208.9	49.4	82.5	119.2	-185.6	-5.4	-103121.3	193.7	1
4	20	1.6	0.2	5	60	0	RTU	RTU	40	NG	132.4	31.4	10.1	45663.4	49.9	82.5	119.2	-193.7	-5.7	-107552	201.7	1
4	20	2	0.2	5	60	0	RTU	RTU	40	NG	133	31.7	10.2	46107.8	50.4	82.5	119.2	-199	-5.8	-110476.3	207	1
4	20	1.6	0.2	5	60	0	RTU	RTU	20	NG	133.5	31.4	10.3	46565.1	51	82.5	119.2	-197.4	-5.8	-109614.8	205.3	1
4	20	2.5	0.2	20	60	0	RTU	RTU	40	NG	136.4	30.8	10.1	45269.3	49.2	87.3	128.7	-103.4	-3	-139788.6	108.9	1
4	20	2.5	0.2	5	60	0	RTU	RTU	40	NG	133.6	32.2	10.4	46656.6	51.1	82.5	119.2	-201.7	-5.9	-111854.1	209.7	1
4	20	2	0.2	5	60	0	RTU	RTU	20	NG	134	31.7	10.4	47009.6	51.5	82.5	119.2	-202.8	-5.9	-112537.9	210.7	1
4	20	2.5	0.2	5	60	0	RTU	RTU	20	NG	134.7	32.2	10.6	47558.3	52.2	82.5	119.2	-205.4	-6	-113913.6	213.3	1
4	20	2.5	0.1	20	60	0	RTU	RTU	20	NG	133.2	27.9	9.4	42533.2	45.9	87.3	127.9	-101.6	-3	-138876.4	107.3	2
4	20	2.5	0.2	5	80	0	RTU	RTU	20	NG	119.6	20.6	7.4	33391.2	35.1	84.5	117.9	-175.7	-5.1	-129230.4	183.7	2
4	20	2.5	0.2	20	80	0	RTU	RTU	20	NG	123.4	19.8	7.2	32621.3	33.8	89.6	128	-77.4	-2.3	-342215.5	82.7	2
4	20	2	0.2	20	60	0	RTU	RTU	20	NG	135.3	29.2	9.8	44221.5	47.9	87.4	128.7	-96.4	-2.8	-134024.1	101.9	2
4	20	2	0.2	20	80	0	RTU	RTU	40	NG	120.3	18.3	6.7	29943.5	30.6	89.7	128.2	-62.9	-1.8	-321244	68.4	2
4	20	2	0.2	20	60	0	RTU	RTU	40	NG	134.2	29.2	9.6	43319.7	46.8	87.4	128.7	-92.7	-2.7	-128859	98.3	2
4	20	2.5	0.1	20	60	0	RTU	RTU	40	NG	132.1	27.9	9.2	41631.4	44.8	87.3	127.9	-97.9	-2.9	-133798.6	103.7	2
4	20	2.5	0.2	20	80	0	RTU	RTU	40	NG	122.3	19.8	7	31719.6	32.8	89.6	128	-73.6	-2.2	-325784.8	79.1	2
4	20	2	0.1	20	60	0	RTU	RTU	20	NG	131	26.3	9	40631.1	43.6	87.4	128	-90.8	-2.7	-128080.8	96.7	2
4	20	2	0.2	20	80	0	RTU	RTU	20	NG	121.4	18.3	6.9	30845.2	31.7	89.7	128.2	-66.6	-1.9	-340217.9	72.1	2
4	40	0.8	0.1	20	80	0	RTU	RTU	20	NG	108	8.5	4.2	18686.6	17	90.9	126.2	84.5	2.5	-1138519.2	-78.6	3
4	40	1.2	0.1	20	80	0	RTU	RTU	20	NG	109.4	9.6	4.5	20040.7	18.7	90.7	125.9	16.1	0.5	-731715.6	-10.1	3
4	40	2	0.1	20	80	0	RTU	RTU	40	NG	111.2	11.7	4.8	21745.4	20.7	90.4	125.7	-34	-1	-847258.2	40	3
4	40	1.6	0.1	20	80	0	RTU	RTU	40	NG	109.7	10.6	4.5	20445.7	19.2	90.6	125.8	-12.5	-0.4	-1229380.5	18.5	3
4	40	1.2	0.1	20	80	0	RTU	RTU	40	NG	108.3	9.6	4.3	19139	17.6	90.7	125.9	19.8	0.6	-901011.4	-13.8	3
4	40	0.8	0.2	20	80	0	RTU	RTU	40	NG	110.2	10.9	4.6	20740.2	19.5	90.7	126.1	82.6	2.4	-3360342.5	-76.8	3
4	40	0.8	0.1	20	80	0	RTU	RTU	40	NG	106.9	8.5	4	17784.9	15.9	90.9	126.2	88.2	2.6	-1188571	-82.2	3
4	40	2	0.1	20	80	0	RTU	RTU	20	NG	112.2	11.7	5	22647.2	21.8	90.4	125.7	-37.7	-1.1	-939726.1	43.6	3
4	40	0.8	0.2	20	80	0	RTU	RTU	20	NG	111.3	10.9	4.8	21641.9	20.6	90.7	126.1	78.9	2.3	-3209328.7	-73.2	3
4	40	1.6	0.1	20	80	0	RTU	RTU	20	NG	110.8	10.6	4.7	21347.4	20.2	90.6	125.8	-16.2	-0.5	-1594312.7	22.1	3

Mall Retail - Lowest Cost of GHG Abatement - CZ5

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
7	20	2.5	0.2	5	80	0	FC	ASHP	20	NG	93.7	32.6	2.3	10379.8	7.3	86.4	163.4	-157.6	-4.6	-43549.1	170.4	1
4	20	2	0.1	5	80	0.25	RTU	RTU	20	NG	131.1	31.1	9.9	44575.1	48.6	82.5	159.1	-193.3	-5.7	-43208.7	205	1
4	20	2.5	0.1	5	80	0.25	RTU	RTU	20	NG	131.8	31.6	10	45116.5	49.3	82.6	159.1	-195.8	-5.7	-43878.8	207.5	1
20	20	2.5	0.1	5	60	0	RTU	RTU	40	NG	130.4	30	9.4	42285.8	45.7	84.7	163.5	-204.9	-6	-51347.7	215.7	1
20	20	2.5	0.1	5	60	0	RTU	RTU	20	NG	131.5	30	9.6	43187.6	46.8	84.7	163.5	-208.4	-6.1	-52231.8	219.1	1
4	20	2.5	0.1	5	80	0.25	RTU	RTU	40	NG	130.7	31.6	9.8	44214.7	48.2	82.6	159.1	-192.3	-5.6	-43088.2	204	1
7	20	2	0.2	5	80	0	FC	Condensing	20	Elec	111.5	32.1	6.3	28361.5	29.2	82.3	155	-195.4	-5.7	-43296.8	208.7	1
7	20	2.5	0.2	5	80	0	FC	Condensing	20	Elec	112.3	32.6	6.4	29033.5	30	82.3	155	-197.9	-5.8	-43858.5	211.2	1
4	40	2	0.2	5	80	0	FC	Condensing	20	Elec	113	31.1	6.1	27664.7	28.2	84.8	154.7	-173.2	-5.1	-43686.6	185.3	1
4	40	2.5	0.2	5	80	0	FC	Condensing	20	Elec	113.4	31.6	6.2	27985.3	28.6	84.8	154.8	-175.8	-5.1	-44316.4	187.8	1
4	40	1.6	0.2	20	80	0	RTU	RTU	40	NG	132.6	20.9	7.1	31805.6	32.2	100.3	173	-51.7	-1.5	-101034.5	54.9	2
4	40	1.6	0.2	5	80	0	RTU	RTU	40	NG	130.5	23.2	7.6	34348.7	35.6	94.9	170.2	-167.8	-4.9	-97452.4	173.7	2
4	40	2	0.1	20	80	0	RTU	RTU	40	NG	129.5	19	6.5	29445.1	29.4	100.2	173.7	-66.9	-2	-120410.9	70.4	2
4	40	2	0.2	5	80	0	RTU	RTU	40	NG	131.1	23.5	7.7	34782.2	36.1	94.9	170.3	-172.9	-5.1	-100986.5	178.7	2
4	40	1.6	0.2	5	80	0	RTU	RTU	20	NG	131.6	23.2	7.8	35250.4	36.7	94.9	170.2	-171.3	-5	-99502	177.1	2
4	40	2.5	0.2	5	80	0	RTU	RTU	40	NG	131.7	23.9	7.8	35302.5	36.7	95	170.3	-175.4	-5.1	-103083.8	181.2	2
4	40	2.5	0.1	20	80	0	RTU	RTU	40	NG	131.8	20.5	6.9	31274.3	31.6	100.2	173.8	-77.1	-2.3	-141868.9	80.4	2
4	40	2	0.2	5	80	0	RTU	RTU	20	NG	132.1	23.5	7.9	35683.9	37.2	94.9	170.3	-176.4	-5.2	-103047.7	182.2	2
4	40	2	0.1	20	80	0	RTU	RTU	20	NG	130.6	19	6.7	30346.8	30.5	100.2	173.7	-70.4	-2.1	-126765.4	73.8	2
4	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	127.5	20.6	7.1	32049.1	32.8	94.7	170	-173.7	-5.1	-98335.3	179.9	2
7	20	2	0.1	5	80	0	RTU	RTU	20	NG	124.5	21.7	7.4	33131.1	34.4	90	166.5	-193.3	-5.7	-68945.4	202	3
4	60	1.6	0.1	5	80	0	RTU	RTU	20	NG	122.9	18.2	6.4	29016.4	29.3	93.7	168.2	-143.9	-4.2	-72056.6	151	3
4	60	2	0.1	5	80	0	RTU	RTU	20	NG	123.5	18.5	6.5	29430.6	29.8	93.7	168.3	-149	-4.4	-74951.1	156	3
4	40	1.2	0.1	5	80	0	RTU	RTU	40	NG	124.7	19.5	6.6	29779.5	30.1	94.6	169.9	-154.8	-4.5	-86251.6	161.4	3
4	40	0.8	0.1	5	80	0	RTU	RTU	40	NG	124.1	19.1	6.5	29300.8	29.6	94.5	169	-138.6	-4.1	-76969	145.2	3
4	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	123	18.9	6.4	29027.6	29.3	93.7	168.3	-148	-4.3	-74803	155.1	3
4	60	2	0.1	5	80	0	RTU	RTU	40	NG	122.4	18.5	6.3	28528.8	28.7	93.7	168.3	-145.5	-4.3	-73176.1	152.6	3
4	60	1.6	0.1	5	80	0	RTU	RTU	40	NG	121.8	18.2	6.2	28114.7	28.2	93.7	168.2	-140.4	-4.1	-70289.6	147.5	3
7	20	2.5	0.1	5	80	0	RTU	RTU	40	NG	124	22.1	7.3	32759.2	34	90.1	166.6	-192.3	-5.6	-68812.6	201	3
4	60	2.5	0.1	5	80	0	RTU	RTU	20	NG	124.1	18.9	6.6	29929.3	30.4	93.7	168.3	-151.6	-4.4	-76586.1	158.5	3

Mall Retail - Lowest Cost of GHG Abatement - CZ6

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	20	2.5	0.1	20	60	0	RTU	RTU	40	NG	192.9	68.2	19	85392.9	96.8	96.1	256.1	-117.9	-3.5	-140811.6	118.6	1
4	20	2	0.2	20	60	0	RTU	RTU	40	NG	196.7	70.6	19.6	88440.8	100.5	96.2	256.2	-111.9	-3.3	-137734.2	112.3	1
4	20	2	0.1	20	60	0	RTU	RTU	20	NG	190.3	65.6	18.5	83148	94.1	96.2	256.2	-109.8	-3.2	-133085.8	110.7	1
4	20	2	0.2	20	80	0	RTU	RTU	20	NG	170.3	51.1	14.5	65172.9	72.4	97.8	256.2	-81.9	-2.4	-179202.8	83.6	1
4	20	2.5	0.1	20	60	0	RTU	RTU	20	NG	194	68.2	19.2	86294.7	97.9	96.1	256.1	-122.2	-3.6	-145913.6	122.8	1
4	20	2.5	0.2	20	80	0	RTU	RTU	40	NG	172.8	53.6	15	67334.3	75	97.7	256.1	-90	-2.6	-189294.7	91.5	1
4	20	2.5	0.2	20	80	0	RTU	RTU	20	NG	173.9	53.6	15.2	68236	76.1	97.7	256.1	-94.3	-2.8	-198275.7	95.7	1
4	20	2.5	0.2	20	60	0	RTU	RTU	20	NG	201.6	73.2	20.6	92542.3	105.4	96.2	256.1	-128.5	-3.8	-156149.6	128.6	1
4	20	2	0.2	20	60	0	RTU	RTU	20	NG	197.8	70.6	19.8	89342.6	101.5	96.2	256.2	-116.2	-3.4	-142991.7	116.5	1
4	20	2.5	0.2	20	60	0	RTU	RTU	40	NG	200.5	73.2	20.4	91640.5	104.3	96.2	256.1	-124.3	-3.6	-150961	124.4	1
7	40	2.5	0.2	5	80	0	RTU	RTU	40	NG	135.3	34.2	9.5	42751.6	46	89.2	249.5	-175.5	-5.1	-74279.6	183.9	2
4	60	1.2	0.1	5	80	0	RTU	RTU	40	NG	137.4	33.6	9.4	42159.5	45.1	92.3	251.1	-123.8	-3.6	-73633.6	130.5	2
4	60	1.6	0.1	5	80	0	RTU	RTU	40	NG	138.3	34.2	9.5	42849.1	46	92.3	251.1	-133	-3.9	-79077.5	139.7	2
4	60	2	0.1	5	80	0	RTU	RTU	40	NG	139.1	34.7	9.7	43512.3	46.8	92.3	251.1	-139.2	-4.1	-82670.7	145.9	2
4	60	2.5	0.1	5	80	0	RTU	RTU	40	NG	140	35.3	9.8	44309.7	47.7	92.3	251.1	-142.3	-4.2	-84372.4	148.9	2
7	40	2.5	0.2	5	80	0	RTU	RTU	20	NG	136.3	34.2	9.7	43653.4	47.1	89.2	249.5	-179.8	-5.3	-76087.4	188	2
7	40	2	0.2	5	80	0	RTU	RTU	20	NG	135.3	33.6	9.5	42870.7	46.2	89.2	249.5	-176.7	-5.2	-74316.5	185.1	2
4	60	1.2	0.1	5	80	0	RTU	RTU	20	NG	138.5	33.6	9.6	43061.2	46.2	92.3	251.1	-128	-3.7	-76174.8	134.7	2
4	60	1.6	0.1	5	80	0	RTU	RTU	20	NG	139.3	34.2	9.7	43750.8	47	92.3	251.1	-137.3	-4	-81616.3	143.9	2
4	60	2	0.1	5	80	0	RTU	RTU	20	NG	140.1	34.7	9.9	44414.1	47.8	92.3	251.1	-143.5	-4.2	-85206.9	150	2
10	40	2	0.2	5	80	0	RTU	RTU	20	NG	127.5	29.2	8.3	37380.6	39.7	87.9	248.4	-176.7	-5.2	-66346.6	186.3	3
7	40	1.2	0.1	5	80	0	RTU	RTU	20	NG	126.5	27.7	7.9	35501.5	37.3	89.1	249.3	-154.8	-4.5	-64831.9	163.9	3
7	40	1.6	0.1	5	80	0	RTU	RTU	20	NG	127.3	28.2	8	36188.8	38.1	89.2	249.4	-164.1	-4.8	-68864.5	173.1	3
7	40	2	0.1	5	80	0	RTU	RTU	20	NG	128.1	28.8	8.2	36861.2	39	89.1	249.4	-170.3	-5	-71374.6	179.2	3
7	40	2.5	0.1	5	80	0	RTU	RTU	20	NG	129.1	29.4	8.4	37670.6	39.9	89.1	249.4	-173.4	-5.1	-72544.2	182.3	3
7	40	1.6	0.1	5	80	0	RTU	RTU	40	NG	126.2	28.2	7.8	35287	37.1	89.2	249.4	-159.8	-4.7	-67072.1	168.9	3
7	40	2.5	0.1	5	80	0	RTU	RTU	40	NG	128	29.4	8.2	36768.9	38.8	89.1	249.4	-169.1	-5	-70757.2	178.1	3
7	40	2	0.1	5	80	0	RTU	RTU	40	NG	127	28.8	8	35959.5	37.9	89.1	249.4	-166	-4.9	-69584.4	175.1	3
10	40	2.5	0.2	5	80	0	RTU	RTU	20	NG	128.5	29.8	8.5	38135.4	40.6	88	248.5	-179.8	-5.3	-68025.3	189.2	3
10	40	2.5	0.2	5	80	0	RTU	RTU	40	NG	127.5	29.8	8.3	37233.7	39.5	88	248.5	-175.5	-5.1	-66409.1	185	3

Mall Retail - Lowest Cost of GHG Abatement - CZ7a

Wall R	Roof R	Window USI	Infil L/s/m2 ext wall	WWR	HRV	LPD Svgs %	HVAC	Heating	DHW Load Savings	DHW Fuel	TEUI (kWh/m2/yr)	TEDI (kWh/m2/yr)	GHGI (kgCO2e/m2/yr)	GHG (kgCO2e/yr)	NG (ekWh/m2/yr)	Elec (ekWh/m2/yr)	Peak Elec (kW)	Total ICC ($/m2)	% ICC	GHG Abatement ($/tCO2e)	20-year NPV	Step
4	40	0.8	0.1	20	80	0.25	FC	ASHP	40	NG	111.4	71.1	2.7	12047.3	8.3	103.1	271.3	195.1	5.7	-429928.8	-189.7	1
40	60	1.6	0.1	5	60	0	FC	ASHP	40	NG	109	55.7	2.4	10795.2	6.9	102.1	272.7	115.7	3.4	-484376.2	-109.7	1
4	60	1.2	0.1	20	80	0.25	FC	ASHP	40	NG	110.5	68.9	2.6	11841.6	8.1	102.4	270.3	143.1	4.2	-485648.5	-137.4	1
7	40	1.6	0.2	20	80	0.25	FC	ASHP	20	NG	111.1	71.1	2.9	12868	9.4	101.7	270.8	68.6	2	-481810	-62.5	1
4	60	0.8	0.1	20	80	0.25	FC	ASHP	20	NG	110.3	66	2.8	12427.6	8.9	101.4	269	217.6	6.4	-2890476.2	-211.3	1
4	60	1.2	0.1	20	80	0.25	FC	ASHP	20	NG	111.6	68.9	2.8	12743.4	9.2	102.4	270.3	138.9	4.1	-471157.3	-133.2	1
4	40	0.8	0.1	20	80	0.25	FC	ASHP	20	NG	112.5	71.1	2.9	12949	9.4	103.1	271.3	190.8	5.6	-420513.9	-185.5	1
40	60	1.6	0.1	5	60	0	FC	ASHP	20	NG	110.1	55.7	2.6	11696.9	8	102.1	272.7	111.4	3.3	-466492.1	-105.5	1
7	40	1.6	0.2	20	80	0.25	FC	ASHP	40	NG	110	71.1	2.7	11966.3	8.3	101.7	270.8	72.8	2.1	-511821.3	-66.7	1
4	60	0.8	0.1	20	80	0.25	FC	ASHP	40	NG	109.2	66	2.6	11525.9	7.8	101.4	269	221.8	6.5	-2947221.2	-215.5	1
40	40	2.5	0.2	5	80	0	RTU	RTU	20	NG	137.9	41.8	8.1	36671	38.1	99.8	269	50.6	1.5	-2293406.5	-46.4	2
40	40	1.6	0.2	5	80	0	RTU	RTU	20	NG	135.7	40.4	7.7	34885	36	99.7	268.9	59.9	1.8	-8971524.6	-55.5	2
40	60	1.2	0.2	20	80	0	FC	ASHP	40	NG	107.3	42.5	2.1	9546.1	5.4	101.9	267	291.2	8.5	-1638977	-284.9	2
40	40	2	0.2	5	80	0	RTU	RTU	20	NG	136.7	41	7.9	35696.4	36.9	99.7	268.9	53.7	1.6	-3882309.8	-49.4	2
40	60	2	0.1	20	80	0	FC	ASHP	40	NG	107	42.1	2.1	9502	5.4	101.6	266.8	235.7	6.9	-1930910.2	-229.3	2
40	40	1.2	0.1	20	80	0	FC	ASHP	40	NG	107.2	41.7	2.1	9559.1	5.4	101.8	266.9	270.8	7.9	-1622681.6	-264.5	2
40	40	2.5	0.2	5	80	0	RTU	RTU	40	NG	136.8	41.8	7.9	35769.2	37	99.8	269	54.9	1.6	-2487004	-50.6	2
40	40	2	0.2	5	80	0	RTU	RTU	40	NG	135.6	41	7.7	34794.6	35.8	99.7	268.9	58	1.7	-4191152.7	-53.6	2
40	60	2	0.1	20	80	0	FC	ASHP	20	NG	108.1	42.1	2.3	10403.7	6.4	101.6	266.8	231.4	6.8	-1895918.8	-225.1	2
40	40	1.6	0.2	5	80	0	RTU	RTU	40	NG	134.6	40.4	7.5	33983.2	34.9	99.7	268.9	64.2	1.9	-9611479.9	-59.7	2
20	60	0.8	0.2	5	80	0	RTU	RTU	40	NG	133.2	39.6	7.3	32874.4	33.5	99.7	268.6	-51.1	-1.5	-31551198.8	55.7	3
40	40	0.8	0.1	20	80	0	FC	ASHP	20	NG	107.5	38.9	2.3	10228	6.3	101.3	265.8	345.2	10.1	-7550490.3	-338.7	3
20	60	0.8	0.2	5	80	0	RTU	RTU	20	NG	134.3	39.6	7.5	33776.1	34.6	99.7	268.6	-55.4	-1.6	-34189310.5	59.8	3
40	60	0.8	0.2	20	80	0	FC	ASHP	40	NG	106.4	39.7	2.1	9305.3	5.2	101.2	265.6	369.9	10.8	-9179141.2	-363.3	3
40	60	1.6	0.1	20	80	0	FC	ASHP	40	NG	106.3	39.6	2.1	9310.8	5.2	101.1	265.7	260.5	7.6	-17842466.3	-253.8	3
40	40	0.8	0.1	20	80	0	FC	ASHP	40	NG	106.4	38.9	2.1	9326.3	5.2	101.3	265.8	349.5	10.2	-7643915.3	-342.9	3
40	60	0.8	0.2	20	80	0	FC	ASHP	20	NG	107.5	39.7	2.3	10207	6.2	101.2	265.6	365.6	10.7	-9073142.9	-359.1	3
40	60	1.6	0.1	20	80	0	FC	ASHP	20	NG	107.4	39.6	2.3	10212.6	6.2	101.1	265.7	256.2	7.5	-17549853.5	-249.6	3
40	40	1.2	0.2	5	80	0	RTU	RTU	20	NG	134.6	39.7	7.6	34027.3	34.9	99.7	268.9	69.2	2	-22788400	-64.7	3
40	40	1.2	0.2	5	80	0	RTU	RTU	40	NG	133.5	39.7	7.4	33125.5	33.8	99.7	268.9	73.4	2.1	-24195811.4	-68.9	3

LANEWAY Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 3,817.1	$ 3,914.6	$ 4,154.09	$ 4,168.14	$ 4,235.09	$ 4,251.59	$ 4,265.64	$ 4,332.59	$ 4,367.1	$ 4,464.6
ICC with multiplier (Van=1.0,this Cz =1)	$ 3,817.1	$ 3,914.6	$ 4,154.09	$ 4,168.14	$ 4,235.09	$ 4,251.59	$ 4,265.64	$ 4,332.59	$ 4,367.1	$ 4,464.6
Net Present Value [$]	$ 2,562.42	$ 2,544.53	$ 4,032.48	$ 3,019.69	$ 3,441.88	$ 4,005.27	$ 2,998.51	$ 3,418.33	$ 2,248.92	$ 2,230.66
Incremental dollars per GHG saving	$ 140.85	$ 142.87	$ 119.37	$ 136.66	$ 129.91	$ 121.13	$ 138.5	$ 131.69	$ 52.81	$ 53.73
Auxiliary Energy Required Heating [GJ/yr]	8.9	8.8	6.4	7.8	7.1	6.3	7.7	7	8.9	8.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4
Annual Energy Space Heating [GJ/yr]	8.9	8.8	6.4	7.8	7.1	6.3	7.7	7	8.9	8.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	48.6	48.5	46.1	47.5	46.8	46	47.4	46.7	47.6	47.5
Design Heating Load [W]	3211.2	3187.2	3055.6	3090.6	3055.6	3031.6	3066.6	3031.6	3211.2	3187.2
Annual Energy Electricity [kWh/yr]	9764.4	9733.5	9062.5	9450.4	9260.4	9035.2	9420.8	9231.7	9767.2	9736.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,318.35	$ 1,313.98	$ 1,219.03	$ 1,273.92	$ 1,247.03	$ 1,215.17	$ 1,269.73	$ 1,242.97	$ 1,318.74	$ 1,314.39
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	333	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	3247	3517	115	1627	61	385	1897	331	3249	3519
Upgrade Package List	Pkg2100101011	Pkg2100102011	Pkg1100101031	Pkg1200101011	Pkg1100101021	Pkg1100102031	Pkg1200102011	Pkg1100102021	Pkg2100101011	Pkg2100102011
GHGI [kg/m2]	11.49	11.48	11.38	11.44	11.41	11.37	11.43	11.4	10.69	10.68
% ICC	1.9%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	128	128	128	128	128	128	128	128	128	128
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35.6	35.2	25.5	31.1	28.4	25.1	30.7	28	35.6	35.2
Output: MEUI [kWh/(m2 * yr)]	91.7	91.3	81.7	87.2	84.5	81.3	86.8	84.1	87.4	87
Output: Better than ERS (%)	490.0%	510.0%	980.0%	700.0%	840.0%	1000.0%	720.0%	860.0%	680.0%	700.0%
Output: Better than Envelope (%)	3090.0%	2940.0%	590.0%	1470.0%	440.0%	740.0%	1320.0%	290.0%	3090.0%	2940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2478	2509	3180	2792	2982	3208	2822	3011	2476	2506
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 349.44	$ 353.8	$ 448.41	$ 393.71	$ 420.5	$ 452.26	$ 397.89	$ 424.55	$ 349.05	$ 353.39
Annual savings in carbon tax for electricity [$/year]	$ 1.24	$ 1.25	$ 1.59	$ 1.4	$ 1.49	$ 1.6	$ 1.41	$ 1.51	$ 1.24	$ 1.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 350.68	$ 355.05	$ 450.	$ 395.11	$ 422.	$ 453.86	$ 399.3	$ 426.06	$ 350.28	$ 354.64
Annual savings in GHG from electricity savings [kg CO2e/year]	27.3	27.6	35	30.7	32.8	35.3	31	33.1	27.2	27.6
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	0	0	1.08	1.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ 10.01	$ 10.01
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ 2.5	$ 2.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 12.51	$ 12.51
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	55.5	55.5
Net Present Value [$]	$ 2,562.42	$ 2,544.53	$ 4,032.48	$ 3,019.69	$ 3,441.88	$ 4,005.27	$ 2,998.51	$ 3,418.33	$ 2,248.92	$ 2,230.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	8.6	9.99	9.99	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 25	NA	NA
Window Cost of Upgrade	$.	$.	$ 836.99	$.	$ 917.99	$ 836.99	$.	$ 917.99	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	3.87	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 1,832.1
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

LANEWAY Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC Effr14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 4,928.09	$ 5,025.59	$ 5,428.09	$ 5,478.09	$ 5,525.59	$ 5,575.59	$ 5,779.13	$ 5,778.09	$ 5,801.87	$ 5,876.63
ICC with multiplier (Van=1.0,this Cz =1)	$ 4,928.09	$ 5,025.59	$ 5,428.09	$ 5,478.09	$ 5,525.59	$ 5,575.59	$ 5,779.13	$ 5,778.09	$ 5,801.87	$ 5,876.63
Net Present Value [$]	$ 1,099.91	$ 1,117.08	$ 1,268.71	$ 1,059.07	$ 1,286.6	$ 1,077.15	$ 804.69	$ 980.21	$ 1,929.69	$ 824.95
Incremental dollars per GHG saving	$ 7.08	$ 7.21	$ 7.78	$ 7.84	$ 7.91	$ 7.97	$ 8.24	$ 8.25	$ 8.33	$ 8.38
Auxiliary Energy Required Heating [GJ/yr]	9.1	9	8.7	8.8	8.5	8.7	7.5	8.7	9.1	7.4
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.1	7.6	7.1	7.6	6.7	7.6	7.6
Annual Energy Space Heating [GJ/yr]	9.1	9	8.7	8.8	8.5	8.7	7.5	8.7	9.1	7.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	43	42.8	42.5	42.1	42.4	42	41.4	41.6	42.9	41.2
Design Heating Load [W]	3055.6	3031.6	2969.6	3055.6	2945.6	3031.6	2849	3055.6	3053.9	2825
Annual Energy Electricity [kWh/yr]	11933.5	11902.3	11804.8	11704	11773.9	11673.1	11488.2	11556.8	11916.4	11458.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,625.28	$ 1,620.86	$ 1,607.06	$ 1,592.8	$ 1,602.69	$ 1,588.43	$ 1,562.27	$ 1,571.97	$ 1,622.86	$ 1,558.02
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	121	391	3361	123	3631	393	1741	125	1201	2011
Upgrade Package List	Pkg1100101031	Pkg1100102031	Pkg2100101031	Pkg1100101031	Pkg2100102031	Pkg1100102031	Pkg1200101031	Pkg1100101031	Pkg1100301031	Pkg1200102031
GHGI [kg/m2]	1.88	1.88	1.86	1.85	1.86	1.84	1.81	1.82	1.88	1.81
% ICC	2.5%	2.5%	2.7%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	3.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	128	128	128	128	128	128	128	128	128	128
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	36.3	35.9	34.5	35.2	34.1	34.8	30	34.5	36.1	29.5
Output: MEUI [kWh/(m2 * yr)]	69.1	68.7	67.3	65.8	66.8	65.4	62.7	63.7	68.9	62.3
Output: Better than ERS (%)	1430.0%	1470.0%	1530.0%	1610.0%	1550.0%	1630.0%	1750.0%	1710.0%	1450.0%	1790.0%
Output: Better than Envelope (%)	3380.0%	3240.0%	2790.0%	2940.0%	2500.0%	2790.0%	1030.0%	2790.0%	3380.0%	880.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	309	340	438	539	469	570	754	686	326	784
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 43.6	$ 48.	$ 61.74	$ 75.96	$ 66.1	$ 80.31	$ 106.38	$ 96.71	$ 46.01	$ 110.61
Annual savings in carbon tax for electricity [$/year]	$ .15	$ .17	$ .22	$ .27	$ .23	$ .28	$ .38	$ .34	$ .16	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 43.75	$ 48.17	$ 61.96	$ 76.23	$ 66.34	$ 80.6	$ 106.76	$ 97.05	$ 46.17	$ 111.01
Annual savings in GHG from electricity savings [kg CO2e/year]	3.4	3.7	4.8	5.9	5.2	6.3	8.3	7.5	3.6	8.6
Annual savings in natural gas [m3/year]	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96
Annual savings in carbon tax for natural gas [$/year]	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1
Net Present Value [$]	$ 1,099.91	$ 1,117.08	$ 1,268.71	$ 1,059.07	$ 1,286.6	$ 1,077.15	$ 804.69	$ 980.21	$ 1,929.69	$ 824.95
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	9.99	9.99	8.6	8.6	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR14	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 873.78	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$.	$.

LANEWAY Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 5,005.13	$ 5,102.63	$ 4,154.09	$ 4,251.59	$ 5,555.13	$ 5,652.63	$ 4,704.09	$ 5,855.13	$ 4,801.59	$ 5,952.63
ICC with multiplier (Van=1.0,this Cz =1)	$ 5,005.13	$ 5,102.63	$ 4,154.09	$ 4,251.59	$ 5,555.13	$ 5,652.63	$ 4,704.09	$ 5,855.13	$ 4,801.59	$ 5,952.63
Net Present Value [$]	$ 4,152.24	$ 4,119.38	$ 4,032.48	$ 4,005.27	$ 3,840.38	$ 3,807.51	$ 3,719.88	$ 3,693.66	$ 3,692.68	$ 3,660.61
Incremental dollars per GHG saving	$ 128.67	$ 130.17	$ 119.37	$ 121.13	$ 58.72	$ 59.56	$ 51.98	$ 44.9	$ 52.88	$ 45.54
Auxiliary Energy Required Heating [GJ/yr]	5	5	6.4	6.3	5.1	5	6.4	5.1	6.3	5
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	12.4	12.4	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	5	5	6.4	6.3	5.1	5	6.4	5.1	6.3	5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	44.8	44.7	46.1	46	43.7	43.6	45	43	44.9	42.9
Design Heating Load [W]	2849	2825	3055.6	3031.6	2849	2825	3055.6	2849	3031.6	2825
Annual Energy Electricity [kWh/yr]	8685.4	8660.3	9062.5	9035.2	8687.5	8662.4	9064.9	8688.9	9037.6	8663.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,165.67	$ 1,162.12	$ 1,219.03	$ 1,215.17	$ 1,165.97	$ 1,162.41	$ 1,219.37	$ 1,166.16	$ 1,215.51	$ 1,162.61
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	333	333	333	314.3	333	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64	$ 143.64	$ 135.58	$ 143.64	$ 135.58
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1735	2005	115	385	1737	2007	117	1739	387	2009
Upgrade Package List	Pkg1200101031	Pkg1200102031	Pkg1100101031	Pkg1100102031	Pkg1200101031	Pkg1200102031	Pkg1100101031	Pkg1200101031	Pkg1100102031	Pkg1200102031
GHGI [kg/m2]	11.32	11.31	11.38	11.37	10.52	10.51	10.58	10.01	10.57	10
% ICC	2.5%	2.6%	2.1%	2.1%	2.8%	2.8%	2.4%	2.9%	2.4%	3.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	128	128	128	128	128	128	128	128	128	128
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	20.1	19.8	25.5	25.1	20.2	19.8	25.6	20.2	25.2	19.8
Output: MEUI [kWh/(m2 * yr)]	76.2	75.9	81.7	81.3	71.9	71.6	77.4	69.2	77	68.8
Output: Better than ERS (%)	1230.0%	1250.0%	980.0%	1000.0%	1450.0%	1470.0%	1190.0%	1590.0%	1210.0%	1600.0%
Output: Better than Envelope (%)	2650.0%	2650.0%	590.0%	740.0%	2500.0%	2650.0%	590.0%	2500.0%	740.0%	2650.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3557	3582	3180	3208	3555	3580	3178	3554	3205	3579
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 501.58	$ 505.12	$ 448.41	$ 452.26	$ 501.28	$ 504.82	$ 448.07	$ 501.09	$ 451.92	$ 504.62
Annual savings in carbon tax for electricity [$/year]	$ 1.78	$ 1.79	$ 1.59	$ 1.6	$ 1.78	$ 1.79	$ 1.59	$ 1.78	$ 1.6	$ 1.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 503.36	$ 506.91	$ 450.	$ 453.86	$ 503.06	$ 506.61	$ 449.66	$ 502.86	$ 453.52	$ 506.41
Annual savings in GHG from electricity savings [kg CO2e/year]	39.1	39.4	35	35.3	39.1	39.4	35	39.1	35.3	39.4
Annual savings in natural gas [m3/year]	0	0	0	0	1.08	1.08	1.08	1.78	1.08	1.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ 10.01	$ 10.01	$ 10.01	$ 16.47	$ 10.01	$ 16.47
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ 2.5	$ 2.5	$ 2.5	$ 4.11	$ 2.5	$ 4.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ 12.51	$ 12.51	$ 12.51	$ 20.58	$ 12.51	$ 20.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	55.5	55.5	55.5	91.3	55.5	91.3
Net Present Value [$]	$ 4,152.24	$ 4,119.38	$ 4,032.48	$ 4,005.27	$ 3,840.38	$ 3,807.51	$ 3,719.88	$ 3,693.66	$ 3,692.68	$ 3,660.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	3.87	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.

LANEWAY Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 4,654.09	$ 4,751.59	$ 5,204.09	$ 5,301.59	$ 5,382.59	$ 5,504.09	$ 5,505.13	$ 5,527.87	$ 5,586.13	$ 5,601.59
ICC with multiplier (Van=1.0,this Cz =1)	$ 4,654.09	$ 4,751.59	$ 5,204.09	$ 5,301.59	$ 5,382.59	$ 5,504.09	$ 5,505.13	$ 5,527.87	$ 5,586.13	$ 5,601.59
Net Present Value [$]	$ 3,821.33	$ 3,792.48	$ 3,508.73	$ 3,480.25	$ 2,906.82	$ 3,361.65	$ 3,917.9	$ 2,976.03	$ 3,396.14	$ 3,333.17
Incremental dollars per GHG saving	$ 129.28	$ 130.9	$ 56.75	$ 57.63	$ 59.87	$ 43.17	$ 137.29	$ 153.13	$ 146.23	$ 43.83
Auxiliary Energy Required Heating [GJ/yr]	6	5.9	6	5.9	6.6	6	4.7	6	5.3	5.9
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	12.4	12.4	11.7	13.5	13.5	13.5	11.7
Annual Energy Space Heating [GJ/yr]	6	5.9	6	5.9	6.6	6	4.7	6	5.3	5.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	45.7	45.6	44.6	44.5	45.2	43.9	44.4	45.7	45	43.8
Design Heating Load [W]	2969.6	2945.6	2969.6	2945.6	2945.6	2969.6	2763	2967.9	2763	2945.6
Annual Energy Electricity [kWh/yr]	8950.3	8923.6	8952.7	8925.9	9117.2	8954.2	8582.2	8939.2	8753.4	8927.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,203.15	$ 1,199.37	$ 1,203.49	$ 1,199.7	$ 1,226.77	$ 1,203.7	$ 1,151.07	$ 1,201.58	$ 1,175.29	$ 1,199.91
Annual Energy Natural Gas [m3/yr]	362.1	362.1	333	333	333	314.3	362.1	362.1	362.1	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.64	$ 143.64	$ 143.64	$ 135.58	$ 156.2	$ 156.2	$ 156.2	$ 135.58
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	3355	3625	3357	3627	3573	3359	4975	4435	4921	3629
Upgrade Package List	Pkg2100101031	Pkg2100102031	Pkg2100101031	Pkg2100102031	Pkg2100102021	Pkg2100101031	Pkg2200101031	Pkg2100301031	Pkg2200101021	Pkg2100102031
GHGI [kg/m2]	11.36	11.36	10.56	10.56	10.59	10.05	11.3	11.36	11.33	10.04
% ICC	2.3%	2.4%	2.6%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	23.9	23.5	24	23.6	26.3	24	18.6	23.8	21.1	23.6
Output: MEUI [kWh/(m2 * yr)]	80	79.7	75.8	75.4	78.1	73	74.8	79.9	77.2	72.6
Output: Better than ERS (%)	1060.0%	1080.0%	1270.0%	1290.0%	1150.0%	1410.0%	1310.0%	1060.0%	1190.0%	1430.0%
Output: Better than Envelope (%)	1180.0%	1320.0%	1180.0%	1320.0%	290.0%	1180.0%	3090.0%	1180.0%	2210.0%	1320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3292	3319	3290	3317	3126	3288	3660	3304	3489	3315
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 464.23	$ 467.99	$ 463.89	$ 467.67	$ 440.7	$ 463.68	$ 516.13	$ 465.79	$ 491.99	$ 467.46
Annual savings in carbon tax for electricity [$/year]	$ 1.65	$ 1.66	$ 1.64	$ 1.66	$ 1.56	$ 1.64	$ 1.83	$ 1.65	$ 1.74	$ 1.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 465.87	$ 469.65	$ 465.54	$ 469.33	$ 442.26	$ 465.32	$ 517.96	$ 467.45	$ 493.74	$ 469.11
Annual savings in GHG from electricity savings [kg CO2e/year]	36.2	36.5	36.2	36.5	34.4	36.2	40.3	36.3	38.4	36.5
Annual savings in natural gas [m3/year]	0	0	1.08	1.08	1.08	1.78	0	0	0	1.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ 10.01	$ 10.01	$ 10.01	$ 16.47	$ .03	$ .03	$ .03	$ 16.47
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ 2.5	$ 2.5	$ 2.5	$ 4.11	$ .01	$ .01	$ .01	$ 4.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ 12.51	$ 12.51	$ 12.51	$ 20.58	$ .04	$ .04	$ .04	$ 20.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	55.5	55.5	55.5	91.3	0.2	0.2	0.2	91.3
Net Present Value [$]	$ 3,821.33	$ 3,792.48	$ 3,508.73	$ 3,480.25	$ 2,906.82	$ 3,361.65	$ 3,917.9	$ 2,976.03	$ 3,396.14	$ 3,333.17
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	9.99	8.6	8.6	8.6	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 135.	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR14	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 873.78	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 550.	$ 850.	$.	$.	$.	$ 850.

LANEWAY Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 7,129.13	$ 7,226.63	$ 7,800.41	$ 8,002.91	$ 8,100.41	$ 8,079.13	$ 8,176.63	$ 8,286.63	$ 8,489.13	$ 8,586.63
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,129.13	$ 7,226.63	$ 7,800.41	$ 8,002.91	$ 8,100.41	$ 8,079.13	$ 8,176.63	$ 8,286.63	$ 8,489.13	$ 8,586.63
Net Present Value [$]	$ 894.48	$ 916.94	$ 1,823.21	$ 1,733.76	$ 1,756.58	$ 2,799.04	$ 2,822.96	$ 2,947.56	$ 2,858.11	$ 2,881.3
Incremental dollars per GHG saving	$ 10.09	$ 10.22	$ 11.05	$ 11.32	$ 11.45	$ 11.5	$ 11.63	$ 11.79	$ 12.06	$ 12.19
Auxiliary Energy Required Heating [GJ/yr]	6.6	6.5	6.7	6.6	6.5	6.1	6	6.6	6.5	6.4
Annual Energy DHW [GJ/yr]	6.7	6.7	7.1	6.7	6.7	7.6	7.6	7.1	6.7	6.7
Annual Energy Space Heating [GJ/yr]	6.6	6.5	6.7	6.6	6.5	6.1	6	6.6	6.5	6.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	39.6	39.5	40	39.5	39.4	40.9	40.8	40.8	40.4	40.3
Design Heating Load [W]	2763	2739	2737.2	2761.2	2737.2	2234.7	2210.7	2317.9	2341.9	2317.9
Annual Energy Electricity [kWh/yr]	10998.7	10969.6	11098.7	10985.3	10956.3	11369.5	11340.9	11346.6	11233.2	11204.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,493.	$ 1,488.88	$ 1,507.15	$ 1,491.1	$ 1,487.	$ 1,545.47	$ 1,541.42	$ 1,542.23	$ 1,526.18	$ 1,522.09
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	4985	5255	6873	6497	6875	5017	5287	5271	5003	5273
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200302031	Pkg2200301031	Pkg2200302031	Pkg2200101033	Pkg2200102033	Pkg2200102032	Pkg2200101032	Pkg2200102032
GHGI [kg/m2]	1.74	1.73	1.75	1.73	1.73	1.79	1.79	1.79	1.77	1.77
% ICC	3.6%	3.6%	3.9%	4.0%	4.1%	4.1%	4.1%	4.2%	4.3%	4.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.5	26.1	26.5	26.3	25.9	24.5	24.1	26.3	26.1	25.7
Output: MEUI [kWh/(m2 * yr)]	55.7	55.3	57.1	55.5	55.1	61	60.6	60.7	59.1	58.6
Output: Better than ERS (%)	2110.0%	2130.0%	2030.0%	2130.0%	2150.0%	1850.0%	1870.0%	1870.0%	1950.0%	1970.0%
Output: Better than Envelope (%)	290.0%	440.0%	150.0%	290.0%	440.0%	1030.0%	1180.0%	290.0%	440.0%	590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1244	1273	1144	1257	1286	873	902	896	1010	1038
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 175.4	$ 179.51	$ 161.3	$ 177.29	$ 181.38	$ 123.12	$ 127.15	$ 126.35	$ 142.34	$ 146.41
Annual savings in carbon tax for electricity [$/year]	$ .62	$ .64	$ .57	$ .63	$ .64	$ .44	$ .45	$ .45	$ .5	$ .52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 176.03	$ 180.14	$ 161.88	$ 177.92	$ 182.03	$ 123.56	$ 127.6	$ 126.8	$ 142.84	$ 146.93
Annual savings in GHG from electricity savings [kg CO2e/year]	13.7	14	12.6	13.8	14.2	9.6	9.9	9.9	11.1	11.4
Annual savings in natural gas [m3/year]	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96
Annual savings in carbon tax for natural gas [$/year]	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1
Net Present Value [$]	$ 894.48	$ 916.94	$ 1,823.21	$ 1,733.76	$ 1,756.58	$ 2,799.04	$ 2,822.96	$ 2,947.56	$ 2,858.11	$ 2,881.3
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	9.99	8.6	9.99	8.6	9.99	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	BC EffR14	BC EffR14	BC EffR14	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$ 873.78	$ 873.78	$ 873.78	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.	$ 850.	$ 850.

LANEWAY Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 5,505.13	$ 5,602.63	$ 4,654.09	$ 4,751.59	$ 6,055.13	$ 6,152.63	$ 5,204.09	$ 5,301.59	$ 6,355.13	$ 6,452.63
ICC with multiplier (Van=1.0,this Cz =1)	$ 5,505.13	$ 5,602.63	$ 4,654.09	$ 4,751.59	$ 6,055.13	$ 6,152.63	$ 5,204.09	$ 5,301.59	$ 6,355.13	$ 6,452.63
Net Present Value [$]	$ 3,917.9	$ 3,883.39	$ 3,821.33	$ 3,792.48	$ 3,606.41	$ 3,571.9	$ 3,508.73	$ 3,480.25	$ 3,459.87	$ 3,425.36
Incremental dollars per GHG saving	$ 137.29	$ 139.02	$ 129.28	$ 130.9	$ 63.27	$ 64.09	$ 56.75	$ 57.63	$ 48.33	$ 48.96
Auxiliary Energy Required Heating [GJ/yr]	4.7	4.6	6	5.9	4.7	4.6	6	5.9	4.7	4.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	12.4	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	4.7	4.6	6	5.9	4.7	4.6	6	5.9	4.7	4.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	44.4	44.3	45.7	45.6	43.3	43.2	44.6	44.5	42.6	42.5
Design Heating Load [W]	2763	2739	2969.6	2945.6	2763	2739	2969.6	2945.6	2763	2739
Annual Energy Electricity [kWh/yr]	8582.2	8557.7	8950.3	8923.6	8584.2	8559.7	8952.7	8925.9	8585.5	8561
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,151.07	$ 1,147.6	$ 1,203.15	$ 1,199.37	$ 1,151.35	$ 1,147.88	$ 1,203.49	$ 1,199.7	$ 1,151.53	$ 1,148.07
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	333	333	333	333	314.3	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64	$ 143.64	$ 143.64	$ 135.58	$ 135.58
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	4975	5245	3355	3625	4977	5247	3357	3627	4979	5249
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2100101031	Pkg2100102031	Pkg2200101031	Pkg2200102031	Pkg2100101031	Pkg2100102031	Pkg2200101031	Pkg2200102031
GHGI [kg/m2]	11.3	11.3	11.36	11.36	10.5	10.5	10.56	10.56	9.99	9.99
% ICC	2.8%	2.8%	2.3%	2.4%	3.0%	3.1%	2.6%	2.7%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	18.6	18.3	23.9	23.5	18.7	18.3	24	23.6	18.7	18.3
Output: MEUI [kWh/(m2 * yr)]	74.8	74.4	80	79.7	70.5	70.1	75.8	75.4	67.7	67.4
Output: Better than ERS (%)	1310.0%	1330.0%	1060.0%	1080.0%	1530.0%	1550.0%	1270.0%	1290.0%	1660.0%	1680.0%
Output: Better than Envelope (%)	3090.0%	3240.0%	1180.0%	1320.0%	3090.0%	3240.0%	1180.0%	1320.0%	3090.0%	3240.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3660	3685	3292	3319	3658	3683	3290	3317	3657	3682
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 516.13	$ 519.58	$ 464.23	$ 467.99	$ 515.85	$ 519.3	$ 463.89	$ 467.67	$ 515.67	$ 519.12
Annual savings in carbon tax for electricity [$/year]	$ 1.83	$ 1.84	$ 1.65	$ 1.66	$ 1.83	$ 1.84	$ 1.64	$ 1.66	$ 1.83	$ 1.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 517.96	$ 521.43	$ 465.87	$ 469.65	$ 517.68	$ 521.14	$ 465.54	$ 469.33	$ 517.49	$ 520.96
Annual savings in GHG from electricity savings [kg CO2e/year]	40.3	40.5	36.2	36.5	40.2	40.5	36.2	36.5	40.2	40.5
Annual savings in natural gas [m3/year]	0	0	0	0	1.08	1.08	1.08	1.08	1.78	1.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ 10.01	$ 10.01	$ 10.01	$ 10.01	$ 16.47	$ 16.47
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 4.11	$ 4.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ 12.51	$ 12.51	$ 12.51	$ 12.51	$ 20.58	$ 20.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	55.5	55.5	55.5	55.5	91.3	91.3
Net Present Value [$]	$ 3,917.9	$ 3,883.39	$ 3,821.33	$ 3,792.48	$ 3,606.41	$ 3,571.9	$ 3,508.73	$ 3,480.25	$ 3,459.87	$ 3,425.36
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.

LANEWAY Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 10,520.27	$ 10,534.03	$ 10,617.77	$ 10,655.28	$ 10,689.02	$ 10,705.28	$ 10,752.78	$ 10,802.78	$ 10,860.27	$ 10,899.02
ICC with multiplier (Van=1.0,this Cz =1)	$ 10,520.27	$ 10,534.03	$ 10,617.77	$ 10,655.28	$ 10,689.02	$ 10,705.28	$ 10,752.78	$ 10,802.78	$ 10,860.27	$ 10,899.02
Net Present Value [$]	$ 4,037.86	$ 4,030.8	$ 4,068.53	$ 3,997.59	$ 4,206.42	$ 3,850.21	$ 4,029.72	$ 3,881.25	$ 4,025.1	$ 4,229.46
Incremental dollars per GHG saving	$ 14.86	$ 14.88	$ 15.	$ 15.04	$ 15.1	$ 15.09	$ 15.17	$ 15.22	$ 15.31	$ 15.38
Auxiliary Energy Required Heating [GJ/yr]	4.5	4.4	4.4	4.2	4.5	4.5	4.1	4.4	4.5	4.2
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.6	7.6	7.1	7.6	7.1	7.1	7.6
Annual Energy Space Heating [GJ/yr]	4.5	4.4	4.4	4.2	4.5	4.5	4.1	4.4	4.5	4.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	39.2	39.2	39.2	39	39.2	38.7	38.9	38.6	38.8	39
Design Heating Load [W]	2035	1996.7	2011	2011.9	2021.5	2034.8	1987.9	2010.8	2059.7	1996.9
Annual Energy Electricity [kWh/yr]	10902.5	10894.4	10876.5	10834.4	10902.4	10757.7	10809	10731.9	10765.5	10829.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,479.39	$ 1,478.24	$ 1,475.71	$ 1,469.75	$ 1,479.37	$ 1,458.9	$ 1,466.16	$ 1,455.25	$ 1,460.	$ 1,469.1
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	12577	13639	12793	13225	12361	13209	13441	13425	11931	13009
Upgrade Package List	Pkg3300301034	Pkg3300403033	Pkg3300302034	Pkg3300401034	Pkg3300203034	Pkg3300401033	Pkg3300402034	Pkg3300402033	Pkg3300201034	Pkg3300303034
GHGI [kg/m2]	1.72	1.72	1.72	1.71	1.72	1.71	1.71	1.69	1.7	1.71
% ICC	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%	5.4%	5.4%	5.5%	5.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	83	83	83	83	83	83	83	83	83	83
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.8	17.7	17.4	16.8	17.8	17.9	16.4	17.5	18	16.7
Output: MEUI [kWh/(m2 * yr)]	54.3	54.2	53.9	53.3	54.3	52.2	53	51.9	52.3	53.3
Output: Better than ERS (%)	2190.0%	2190.0%	2190.0%	2230.0%	2190.0%	2290.0%	2250.0%	2310.0%	2270.0%	2230.0%
Output: Better than Envelope (%)	3380.0%	3530.0%	3530.0%	3820.0%	3380.0%	3380.0%	3970.0%	3530.0%	3380.0%	3820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1340	1348	1366	1408	1340	1485	1434	1511	1477	1413
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 188.97	$ 190.11	$ 192.63	$ 198.57	$ 188.98	$ 209.38	$ 202.15	$ 213.02	$ 208.29	$ 199.22
Annual savings in carbon tax for electricity [$/year]	$ .67	$ .67	$ .68	$ .7	$ .67	$ .74	$ .72	$ .76	$ .74	$ .71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 189.64	$ 190.78	$ 193.32	$ 199.27	$ 189.65	$ 210.13	$ 202.87	$ 213.78	$ 209.02	$ 199.93
Annual savings in GHG from electricity savings [kg CO2e/year]	14.7	14.8	15	15.5	14.7	16.3	15.8	16.6	16.2	15.5
Annual savings in natural gas [m3/year]	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96
Annual savings in carbon tax for natural gas [$/year]	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1
Net Present Value [$]	$ 4,037.86	$ 4,030.8	$ 4,068.53	$ 3,997.59	$ 4,206.42	$ 3,850.21	$ 4,029.72	$ 3,881.25	$ 4,025.1	$ 4,229.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	14.09	9.99	8.6	14.09	8.6	9.99	9.99	8.6	14.09
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 513.75	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR10	BC EffR20	BC EffR20	BC EffR20	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 663.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 663.78	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.	$.

LANEWAY Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 10,520.27	$ 10,534.03	$ 10,617.77	$ 10,655.28	$ 10,705.28	$ 10,689.02	$ 10,752.78	$ 10,802.78	$ 10,860.27	$ 10,899.02
ICC with multiplier (Van=1.0,this Cz =1)	$ 10,520.27	$ 10,534.03	$ 10,617.77	$ 10,655.28	$ 10,705.28	$ 10,689.02	$ 10,752.78	$ 10,802.78	$ 10,860.27	$ 10,899.02
Net Present Value [$]	$ 4,037.86	$ 4,030.8	$ 4,068.53	$ 3,997.59	$ 3,850.21	$ 4,206.42	$ 4,029.72	$ 3,881.25	$ 4,025.1	$ 4,229.46
Incremental dollars per GHG saving	$ 14.86	$ 14.88	$ 15.	$ 15.04	$ 15.09	$ 15.1	$ 15.17	$ 15.22	$ 15.31	$ 15.38
Auxiliary Energy Required Heating [GJ/yr]	4.5	4.4	4.4	4.2	4.5	4.5	4.1	4.4	4.5	4.2
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.6	7.1	7.6	7.6	7.1	7.1	7.6
Annual Energy Space Heating [GJ/yr]	4.5	4.4	4.4	4.2	4.5	4.5	4.1	4.4	4.5	4.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	39.2	39.2	39.2	39	38.7	39.2	38.9	38.6	38.8	39
Design Heating Load [W]	2035	1996.7	2011	2011.9	2034.8	2021.5	1987.9	2010.8	2059.7	1996.9
Annual Energy Electricity [kWh/yr]	10902.5	10894.4	10876.5	10834.4	10757.7	10902.4	10809	10731.9	10765.5	10829.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,479.39	$ 1,478.24	$ 1,475.71	$ 1,469.75	$ 1,458.9	$ 1,479.37	$ 1,466.16	$ 1,455.25	$ 1,460.	$ 1,469.1
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	12577	13639	12793	13225	13209	12361	13441	13425	11931	13009
Upgrade Package List	Pkg3300301034	Pkg3300403033	Pkg3300302034	Pkg3300401034	Pkg3300401033	Pkg3300203034	Pkg3300402034	Pkg3300402033	Pkg3300201034	Pkg3300303034
GHGI [kg/m2]	1.72	1.72	1.72	1.71	1.7	1.72	1.71	1.69	1.7	1.71
% ICC	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%	5.4%	5.4%	5.5%	5.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	83	83	83	83	83	83	83	83	83	83
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.8	17.7	17.4	16.8	17.9	17.8	16.4	17.5	18	16.7
Output: MEUI [kWh/(m2 * yr)]	54.3	54.2	53.9	53.3	52.2	54.3	53	51.9	52.3	53.3
Output: Better than ERS (%)	2190.0%	2190.0%	2190.0%	2230.0%	2290.0%	2190.0%	2250.0%	2310.0%	2270.0%	2230.0%
Output: Better than Envelope (%)	3380.0%	3530.0%	3530.0%	3820.0%	3380.0%	3380.0%	3970.0%	3530.0%	3380.0%	3820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1340	1348	1366	1408	1485	1340	1434	1511	1477	1413
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 188.97	$ 190.11	$ 192.63	$ 198.57	$ 209.38	$ 188.98	$ 202.15	$ 213.02	$ 208.29	$ 199.22
Annual savings in carbon tax for electricity [$/year]	$ .67	$ .67	$ .68	$ .7	$ .74	$ .67	$ .72	$ .76	$ .74	$ .71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 189.64	$ 190.78	$ 193.32	$ 199.27	$ 210.13	$ 189.65	$ 202.87	$ 213.78	$ 209.02	$ 199.93
Annual savings in GHG from electricity savings [kg CO2e/year]	14.7	14.8	15	15.5	16.3	14.7	15.8	16.6	16.2	15.5
Annual savings in natural gas [m3/year]	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49	13.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96	$ 124.96
Annual savings in carbon tax for natural gas [$/year]	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19	$ 31.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15	$ 156.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1	693.1
Net Present Value [$]	$ 4,037.86	$ 4,030.8	$ 4,068.53	$ 3,997.59	$ 3,850.21	$ 4,206.42	$ 4,029.72	$ 3,881.25	$ 4,025.1	$ 4,229.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	14.09	9.99	8.6	8.6	14.09	9.99	9.99	8.6	14.09
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 135.	$ 513.75	$ 232.5	$ 232.5	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR20	BC EffR20	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 663.78	$ 1,008.79	$ 1,008.79	$ 663.78	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 550.	$.

LANEWAY Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 11,388.91	$ 11,557.66	$ 11,486.41	$ 11,618.91	$ 11,523.92	$ 11,746.27	$ 11,938.91	$ 11,716.41	$ 11,621.42	$ 11,843.77
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,388.91	$ 11,557.66	$ 11,486.41	$ 11,618.91	$ 11,523.92	$ 11,746.27	$ 11,938.91	$ 11,716.41	$ 11,621.42	$ 11,843.77
Net Present Value [$]	$ 1,506.86	$ 1,675.79	$ 1,698.39	$ 1,708.19	$ 1,764.38	$ 1,794.65	$ 1,814.7	$ 1,821.03	$ 1,861.7	$ 1,903.48
Incremental dollars per GHG saving	$ 271.17	$ 275.18	$ 276.12	$ 275.98	$ 277.69	$ 277.69	$ 122.2	$ 278.3	$ 280.03	$ 280.
Auxiliary Energy Required Heating [GJ/yr]	4.4	4.4	4.3	4	4.2	3.8	4.4	3.9	4.1	3.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	1.8	1.9	1.8	1.7	1.8	1.6	1.8	1.7	1.8	1.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	43.7	43.7	43.9	43.7	43.9	43.6	42.7	43.7	43.9	43.7
Design Heating Load [W]	2315	2301.5	2291	2232.5	2291.8	2197.6	2315	2208.5	2267.8	2173.6
Annual Energy Electricity [kWh/yr]	8403.9	8404	8440.4	8392.8	8451.5	8376.9	8404.5	8398.7	8451.4	8381.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,125.84	$ 1,125.85	$ 1,131.	$ 1,124.27	$ 1,132.57	$ 1,122.02	$ 1,125.92	$ 1,125.1	$ 1,132.56	$ 1,122.64
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	333	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	10592	10376	10808	9962	11240	11888	10594	10178	11456	12104
Upgrade Package List	Pkg3200301032	Pkg3200203032	Pkg3200302032	Pkg3200201033	Pkg3200401032	Pkg3300201032	Pkg3200301032	Pkg3200202033	Pkg3200402032	Pkg3300202032
GHGI [kg/m2]	11.27	11.27	11.28	11.27	11.28	11.27	10.47	11.27	11.28	11.27
% ICC	5.7%	5.8%	5.8%	5.8%	5.8%	5.9%	6.0%	5.9%	5.8%	6.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	83	83	83	83	83	83	83	83	83	83
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.7	17.7	17.3	16	16.8	15.3	17.7	15.7	16.4	15
Output: MEUI [kWh/(m2 * yr)]	71.5	71.5	72	71.3	72.1	71.1	67.1	71.4	72.1	71.1
Output: Better than ERS (%)	1920.0%	1920.0%	1890.0%	1920.0%	1890.0%	1940.0%	2110.0%	1920.0%	1890.0%	1920.0%
Output: Better than Envelope (%)	3530.0%	3530.0%	3680.0%	4120.0%	3820.0%	4410.0%	3530.0%	4260.0%	3970.0%	4410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3839	3839	3802	3850	3791	3866	3838	3844	3791	3861
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 541.27	$ 541.26	$ 536.12	$ 542.84	$ 534.56	$ 545.08	$ 541.19	$ 542.	$ 534.57	$ 544.46
Annual savings in carbon tax for electricity [$/year]	$ 1.92	$ 1.92	$ 1.9	$ 1.92	$ 1.9	$ 1.93	$ 1.92	$ 1.92	$ 1.9	$ 1.93
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 543.19	$ 543.18	$ 538.03	$ 544.76	$ 536.45	$ 547.01	$ 543.11	$ 543.93	$ 536.47	$ 546.39
Annual savings in GHG from electricity savings [kg CO2e/year]	42.2	42.2	41.8	42.3	41.7	42.5	42.2	42.3	41.7	42.5
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	1.08	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ 10.01	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ 2.5	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 12.51	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	55.5	0.2	0.2	0.2
Net Present Value [$]	$ 1,506.86	$ 1,675.79	$ 1,698.39	$ 1,708.19	$ 1,764.38	$ 1,794.65	$ 1,814.7	$ 1,821.03	$ 1,861.7	$ 1,903.48
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	14.09	9.99	8.6	8.6	8.6	8.6	9.99	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 135.	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	7.04	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 663.78	$ 873.78	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 663.78	$ 1,008.79	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

LANEWAY Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 4,154.09	$ 4,251.59	$ 4,654.09	$ 4,704.09	$ 4,735.09	$ 4,751.59	$ 4,801.59	$ 4,817.87	$ 4,832.59	$ 4,915.37
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 4,457.34	$ 4,561.96	$ 4,993.84	$ 5,047.49	$ 5,080.75	$ 5,098.46	$ 5,152.11	$ 5,169.57	$ 5,185.37	$ 5,274.19
Net Present Value [$]	$ 5,745.25	$ 5,740.68	$ 5,727.27	$ 5,432.35	$ 5,051.23	$ 5,721.61	$ 5,428.15	$ 4,871.68	$ 5,049.04	$ 4,867.66
Incremental dollars per GHG saving	$ 99.14	$ 100.51	$ 105.78	$ 48.1	$ 114.37	$ 107.02	$ 48.9	$ 117.51	$ 115.61	$ 118.73
Auxiliary Energy Required Heating [GJ/yr]	10.4	10.3	9.7	10.4	10.6	9.6	10.3	10.7	10.4	10.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	13.5	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	10.4	10.3	9.7	10.4	10.6	9.6	10.3	10.7	10.4	10.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	50.1	50	49.4	49	50.3	49.3	48.9	50.4	50.1	50.3
Design Heating Load [W]	3927	3896.3	3781.6	3927	3781.6	3751	3896.3	3953	3751	3922.4
Annual Energy Electricity [kWh/yr]	10174.5	10138.4	9987.3	10177.4	10218.4	9951.6	10141.2	10256	10181.4	10219.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,376.38	$ 1,371.27	$ 1,349.89	$ 1,376.79	$ 1,382.59	$ 1,344.84	$ 1,371.66	$ 1,387.91	$ 1,377.35	$ 1,382.77
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	332.9	362.1	362.1	332.9	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	15091	15361	18331	15093	18277	18601	15363	15631	18547	15901
Upgrade Package List	Pkg1100101031	Pkg1100102031	Pkg2100101031	Pkg1100101031	Pkg2100101021	Pkg2100102031	Pkg1100102031	Pkg1100201031	Pkg2100102021	Pkg1100202031
GHGI [kg/m2]	11.55	11.55	11.52	10.75	11.56	11.52	10.75	11.57	11.55	11.56
% ICC	2.1%	2.1%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	143	143	143	143	143	143	143	143	143	143
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	41.5	41	38.8	41.5	42.1	38.3	41	42.7	41.6	42.1
Output: MEUI [kWh/(m2 * yr)]	97.6	97.1	94.9	93.3	98.2	94.4	92.8	98.8	97.7	98.2
Output: Better than ERS (%)	1180.0%	1200.0%	1300.0%	1370.0%	1140.0%	1320.0%	1390.0%	1130.0%	1180.0%	1140.0%
Output: Better than Envelope (%)	710.0%	800.0%	1340.0%	710.0%	540.0%	1430.0%	800.0%	450.0%	710.0%	540.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3846	3882	4033	3843	3802	4069	3879	3764	3839	3801
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 542.27	$ 547.36	$ 568.67	$ 541.86	$ 536.08	$ 573.7	$ 546.97	$ 530.78	$ 541.3	$ 535.9
Annual savings in carbon tax for electricity [$/year]	$ 1.92	$ 1.94	$ 2.02	$ 1.92	$ 1.9	$ 2.03	$ 1.94	$ 1.88	$ 1.92	$ 1.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 544.19	$ 549.3	$ 570.68	$ 543.78	$ 537.98	$ 575.74	$ 548.91	$ 532.66	$ 543.22	$ 537.8
Annual savings in GHG from electricity savings [kg CO2e/year]	42.3	42.7	44.4	42.3	41.8	44.8	42.7	41.4	42.2	41.8
Annual savings in natural gas [m3/year]	0.01	0.01	0.01	1.08	0.01	0.01	1.08	0.01	0.01	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ .07	$ 10.01	$ .07	$ .07	$ 10.01	$ .07	$ .07	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ .02	$ 2.5	$ .02	$ .02	$ 2.5	$ .02	$ .02	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ .09	$ 12.51	$ .09	$ .09	$ 12.51	$ .09	$ .09	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	0.4	55.5	0.4	0.4	55.5	0.4	0.4	0.4
Net Present Value [$]	$ 5,745.25	$ 5,740.68	$ 5,727.27	$ 5,432.35	$ 5,051.23	$ 5,721.61	$ 5,428.15	$ 4,871.68	$ 5,049.04	$ 4,867.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	8.6	9.99	9.99	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 1,832.1
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$.	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$.	$.

LANEWAY Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,279.13	$ 6,376.63	$ 6,629.13	$ 6,726.63	$ 6,829.13	$ 6,926.63	$ 7,040.41	$ 7,129.13	$ 7,152.91	$ 7,226.63
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 6,737.51	$ 6,842.12	$ 7,113.06	$ 7,217.67	$ 7,327.66	$ 7,432.27	$ 7,554.36	$ 7,649.56	$ 7,675.07	$ 7,754.17
Net Present Value [$]	$ 1,023.46	$ 1,022.	$ 1,145.99	$ 1,144.53	$ 1,063.02	$ 1,061.02	$ 142.22	$ 1,142.62	$ 171.95	$ 1,140.61
Incremental dollars per GHG saving	$ 8.83	$ 8.96	$ 9.3	$ 9.43	$ 9.57	$ 9.7	$ 9.91	$ 9.97	$ 10.06	$ 10.1
Auxiliary Energy Required Heating [GJ/yr]	10.7	10.5	10.9	10.8	10.4	10.3	10.8	10.2	10.6	10.1
Annual Energy DHW [GJ/yr]	7.6	7.6	6.7	6.7	7.1	7.1	7.6	6.7	7.6	6.7
Annual Energy Space Heating [GJ/yr]	10.7	10.5	10.9	10.8	10.4	10.3	10.8	10.2	10.6	10.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	44.5	44.4	43.8	43.7	43.7	43.5	44.7	43.1	44.5	43
Design Heating Load [W]	3517.9	3487.3	3663.3	3632.7	3517.9	3487.3	3513.3	3517.9	3517.5	3487.3
Annual Energy Electricity [kWh/yr]	12361.3	12324	12177.8	12140.5	12132.3	12095.2	12407.9	11984.9	12352.7	11947.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,685.81	$ 1,680.53	$ 1,659.84	$ 1,654.57	$ 1,653.41	$ 1,648.16	$ 1,692.4	$ 1,632.55	$ 1,684.59	$ 1,627.3
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	19957	20227	16721	16991	19959	20229	20875	19961	21469	20231
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg1200101031	Pkg1200102031	Pkg2200101031	Pkg2200102031	Pkg2200202031	Pkg2200101031	Pkg2200301031	Pkg2200102031
GHGI [kg/m2]	1.95	1.94	1.92	1.92	1.91	1.91	1.96	1.89	1.95	1.89
% ICC	3.2%	3.2%	3.3%	3.4%	3.4%	3.5%	3.5%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	143	143	143	143	143	143	143	143	143	143
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.5	42	43.4	42.9	41.4	40.9	43.2	40.7	42.4	40.1
Output: MEUI [kWh/(m2 * yr)]	75.2	74.7	72.6	72.1	72	71.4	75.9	69.8	75.1	69.3
Output: Better than ERS (%)	2040.0%	2060.0%	2160.0%	2180.0%	2180.0%	2220.0%	2000.0%	2290.0%	2040.0%	2310.0%
Output: Better than Envelope (%)	450.0%	620.0%	270.0%	360.0%	710.0%	800.0%	360.0%	890.0%	540.0%	980.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1659	1696	1843	1880	1888	1925	1612	2036	1668	2073
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 233.93	$ 239.19	$ 259.81	$ 265.07	$ 266.22	$ 271.45	$ 227.36	$ 287.01	$ 235.15	$ 292.24
Annual savings in carbon tax for electricity [$/year]	$ .83	$ .85	$ .92	$ .94	$ .94	$ .96	$ .81	$ 1.02	$ .83	$ 1.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 234.76	$ 240.04	$ 260.73	$ 266.01	$ 267.17	$ 272.42	$ 228.17	$ 288.02	$ 235.98	$ 293.27
Annual savings in GHG from electricity savings [kg CO2e/year]	18.3	18.7	20.3	20.7	20.8	21.2	17.7	22.4	18.3	22.8
Annual savings in natural gas [m3/year]	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93
Annual savings in carbon tax for natural gas [$/year]	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9
Net Present Value [$]	$ 1,023.46	$ 1,022.	$ 1,145.99	$ 1,144.53	$ 1,063.02	$ 1,061.02	$ 142.22	$ 1,142.62	$ 171.95	$ 1,140.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	9.99	8.6	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR14	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 663.78	$.	$ 873.78	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$ 850.	$ 550.	$ 550.	$.	$ 850.	$.	$ 850.

LANEWAY Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 5,005.13	$ 5,102.63	$ 5,555.13	$ 5,652.63	$ 4,154.09	$ 4,251.59	$ 5,855.13	$ 4,654.09	$ 4,751.59	$ 5,952.63
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 5,370.5	$ 5,475.12	$ 5,960.65	$ 6,065.27	$ 4,457.34	$ 4,561.96	$ 6,282.55	$ 4,993.84	$ 5,098.46	$ 6,387.17
Net Present Value [$]	$ 6,188.92	$ 6,181.07	$ 5,876.75	$ 5,868.72	$ 5,745.25	$ 5,740.68	$ 5,729.12	$ 5,727.27	$ 5,721.61	$ 5,721.08
Incremental dollars per GHG saving	$ 105.59	$ 106.75	$ 53.78	$ 54.51	$ 99.14	$ 100.51	$ 42.09	$ 105.78	$ 107.02	$ 42.67
Auxiliary Energy Required Heating [GJ/yr]	8.6	8.5	8.6	8.5	10.4	10.3	8.6	9.7	9.6	8.5
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	12.4	13.5	13.5	11.7	13.5	13.5	11.7
Annual Energy Space Heating [GJ/yr]	8.6	8.5	8.6	8.5	10.4	10.3	8.6	9.7	9.6	8.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	48.3	48.2	47.2	47.1	50.1	50	46.5	49.4	49.3	46.4
Design Heating Load [W]	3663.3	3632.7	3663.3	3632.7	3927	3896.3	3663.3	3781.6	3751	3632.7
Annual Energy Electricity [kWh/yr]	9671.6	9636.8	9674.2	9639.5	10174.5	10138.4	9675.9	9987.3	9951.6	9641.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,305.22	$ 1,300.29	$ 1,305.58	$ 1,300.67	$ 1,376.38	$ 1,371.27	$ 1,305.82	$ 1,349.89	$ 1,344.84	$ 1,300.91
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	332.9	362.1	362.1	314.2	362.1	362.1	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 143.6	$ 156.2	$ 156.2	$ 135.53	$ 156.2	$ 156.2	$ 135.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	16711	16981	16713	16983	15091	15361	16715	18331	18601	16985
Upgrade Package List	Pkg1200101031	Pkg1200102031	Pkg1200101031	Pkg1200102031	Pkg1100101031	Pkg1100102031	Pkg1200101031	Pkg2100101031	Pkg2100102031	Pkg1200102031
GHGI [kg/m2]	11.47	11.47	10.67	10.67	11.55	11.55	10.16	11.52	11.52	10.15
% ICC	2.5%	2.6%	2.8%	2.8%	2.1%	2.1%	2.9%	2.3%	2.4%	3.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	143	143	143	143	143	143	143	143	143	143
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	34.3	33.8	34.3	33.8	41.5	41	34.3	38.8	38.3	33.8
Output: MEUI [kWh/(m2 * yr)]	90.4	89.9	86.1	85.6	97.6	97.1	83.3	94.9	94.4	82.8
Output: Better than ERS (%)	1500.0%	1510.0%	1690.0%	1710.0%	1180.0%	1200.0%	1810.0%	1300.0%	1320.0%	1830.0%
Output: Better than Envelope (%)	2320.0%	2410.0%	2320.0%	2410.0%	710.0%	800.0%	2320.0%	1340.0%	1430.0%	2410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4349	4384	4346	4381	3846	3882	4344	4033	4069	4379
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 613.18	$ 618.09	$ 612.81	$ 617.71	$ 542.27	$ 547.36	$ 612.57	$ 568.67	$ 573.7	$ 617.47
Annual savings in carbon tax for electricity [$/year]	$ 2.17	$ 2.19	$ 2.17	$ 2.19	$ 1.92	$ 1.94	$ 2.17	$ 2.02	$ 2.03	$ 2.19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 615.36	$ 620.28	$ 614.99	$ 619.9	$ 544.19	$ 549.3	$ 614.75	$ 570.68	$ 575.74	$ 619.66
Annual savings in GHG from electricity savings [kg CO2e/year]	47.8	48.2	47.8	48.2	42.3	42.7	47.8	44.4	44.8	48.2
Annual savings in natural gas [m3/year]	0.01	0.01	1.08	1.08	0.01	0.01	1.78	0.01	0.01	1.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ 10.01	$ 10.01	$ .07	$ .07	$ 16.47	$ .07	$ .07	$ 16.47
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ 2.5	$ 2.5	$ .02	$ .02	$ 4.11	$ .02	$ .02	$ 4.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ 12.51	$ 12.51	$ .09	$ .09	$ 20.58	$ .09	$ .09	$ 20.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	55.5	55.5	0.4	0.4	91.3	0.4	0.4	91.3
Net Present Value [$]	$ 6,188.92	$ 6,181.07	$ 5,876.75	$ 5,868.72	$ 5,745.25	$ 5,740.68	$ 5,729.12	$ 5,727.27	$ 5,721.61	$ 5,721.08
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$.	$.	$ 850.

LANEWAY Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 5,505.13	$ 5,602.63	$ 6,055.13	$ 6,136.13	$ 6,152.63	$ 6,168.91	$ 6,233.63	$ 6,266.41	$ 6,355.13	$ 6,378.91
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 5,907.	$ 6,011.62	$ 6,497.15	$ 6,584.07	$ 6,601.77	$ 6,619.24	$ 6,688.68	$ 6,723.86	$ 6,819.05	$ 6,844.57
Net Present Value [$]	$ 6,154.15	$ 6,144.65	$ 5,841.98	$ 5,217.6	$ 5,832.85	$ 5,290.8	$ 5,211.94	$ 5,282.22	$ 5,694.34	$ 5,292.23
Incremental dollars per GHG saving	$ 111.44	$ 112.5	$ 57.5	$ 59.57	$ 58.21	$ 126.93	$ 60.29	$ 127.89	$ 45.04	$ 128.87
Auxiliary Energy Required Heating [GJ/yr]	7.9	7.8	8	8.7	7.8	8.2	8.6	8.1	8	7.9
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	12.4	12.4	13.5	12.4	13.5	11.7	13.5
Annual Energy Space Heating [GJ/yr]	7.9	7.8	8	8.7	7.8	8.2	8.6	8.1	8	7.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	47.7	47.5	46.6	47.3	46.5	47.9	47.2	47.8	45.9	47.6
Design Heating Load [W]	3517.9	3487.3	3517.9	3517.9	3487.3	3543.9	3487.3	3513.3	3517.9	3517.5
Annual Energy Electricity [kWh/yr]	9490.9	9456.7	9493.5	9704.6	9459.2	9568.4	9668.9	9533.9	9495.2	9486.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,279.65	$ 1,274.81	$ 1,280.02	$ 1,309.89	$ 1,275.16	$ 1,290.61	$ 1,304.83	$ 1,285.73	$ 1,280.26	$ 1,279.
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	332.9	332.9	362.1	332.9	362.1	314.2	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 143.6	$ 143.6	$ 156.2	$ 143.6	$ 156.2	$ 135.53	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	19951	20221	19953	19899	20223	20491	20169	20869	19955	21463
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200201031	Pkg2200102021	Pkg2200202031	Pkg2200101031	Pkg2200301031
GHGI [kg/m2]	11.44	11.44	10.64	10.68	10.64	11.46	10.67	11.45	10.13	11.44
% ICC	2.8%	2.8%	3.0%	3.1%	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.7	31.2	31.7	34.7	31.2	32.8	34.2	32.3	31.7	31.6
Output: MEUI [kWh/(m2 * yr)]	87.8	87.3	83.5	86.5	83	88.9	86	88.4	80.7	87.7
Output: Better than ERS (%)	1600.0%	1640.0%	1800.0%	1670.0%	1810.0%	1570.0%	1690.0%	1580.0%	1920.0%	1620.0%
Output: Better than Envelope (%)	2950.0%	3040.0%	2860.0%	2230.0%	3040.0%	2680.0%	2320.0%	2770.0%	2860.0%	2950.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4530	4564	4527	4316	4561	4452	4352	4486	4525	4534
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 638.66	$ 643.48	$ 638.29	$ 608.53	$ 643.13	$ 627.73	$ 613.56	$ 632.6	$ 638.05	$ 639.31
Annual savings in carbon tax for electricity [$/year]	$ 2.26	$ 2.28	$ 2.26	$ 2.16	$ 2.28	$ 2.23	$ 2.18	$ 2.24	$ 2.26	$ 2.27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 640.92	$ 645.76	$ 640.56	$ 610.69	$ 645.41	$ 629.96	$ 615.74	$ 634.84	$ 640.32	$ 641.58
Annual savings in GHG from electricity savings [kg CO2e/year]	49.8	50.2	49.8	47.5	50.2	49	47.9	49.4	49.8	49.9
Annual savings in natural gas [m3/year]	0.01	0.01	1.08	1.08	1.08	0.01	1.08	0.01	1.78	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ 10.01	$ 10.01	$ 10.01	$ .07	$ 10.01	$ .07	$ 16.47	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ 2.5	$ 2.5	$ 2.5	$ .02	$ 2.5	$ .02	$ 4.11	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ 12.51	$ 12.51	$ 12.51	$ .09	$ 12.51	$ .09	$ 20.58	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	55.5	55.5	55.5	0.4	55.5	0.4	91.3	0.4
Net Present Value [$]	$ 6,154.15	$ 6,144.65	$ 5,841.98	$ 5,217.6	$ 5,832.85	$ 5,290.8	$ 5,211.94	$ 5,282.22	$ 5,694.34	$ 5,292.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	9.99	8.6	9.99	9.99	8.6	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR10	NA	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$ 663.78	$.	$ 663.78	$.	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 550.	$.	$ 550.	$.	$ 850.	$.

LANEWAY Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 9,310.27	$ 9,312.78	$ 9,407.77	$ 9,452.91	$ 9,459.02	$ 9,466.67	$ 9,520.27	$ 9,550.41	$ 9,587.92	$ 9,594.03
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,989.92	$ 9,992.61	$ 10,094.54	$ 10,142.97	$ 10,149.53	$ 10,157.74	$ 10,215.25	$ 10,247.59	$ 10,287.84	$ 10,294.39
Net Present Value [$]	$ 1,227.5	$ 1,406.38	$ 1,232.97	$ 1,583.03	$ 1,595.9	$ 1,591.5	$ 1,214.56	$ 1,587.96	$ 1,508.07	$ 1,519.66
Incremental dollars per GHG saving	$ 13.03	$ 13.05	$ 13.16	$ 13.25	$ 13.26	$ 13.27	$ 13.31	$ 13.38	$ 13.42	$ 13.43
Auxiliary Energy Required Heating [GJ/yr]	8.6	8.9	8.5	8.9	8.9	8.9	8.3	8.8	8.6	8.6
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Annual Energy Space Heating [GJ/yr]	8.6	8.9	8.5	8.9	8.9	8.9	8.3	8.8	8.6	8.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	43.4	43.7	43.3	43.7	43.7	43.7	43.1	43.6	43.4	43.4
Design Heating Load [W]	2688.7	2743.6	2658	2814.2	2750.3	2770.2	2662.2	2783.5	2789.5	2725.6
Annual Energy Electricity [kWh/yr]	12058.3	12126.8	12022.5	12141	12143.6	12138.9	11971.7	12105	12059.4	12061.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,642.93	$ 1,652.63	$ 1,637.87	$ 1,654.64	$ 1,655.	$ 1,654.34	$ 1,630.68	$ 1,649.54	$ 1,643.09	$ 1,643.39
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	22999	24493	23215	21523	24061	22783	23647	21901	22369	24709
Upgrade Package List	Pkg2300201033	Pkg2300402032	Pkg2300202033	Pkg2200301034	Pkg2300303032	Pkg2200403033	Pkg2300301033	Pkg2200302034	Pkg2200401034	Pkg2300403032
GHGI [kg/m2]	1.9	1.91	1.9	1.92	1.92	1.92	1.89	1.91	1.9	1.9
% ICC	4.7%	4.7%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	34.4	35.4	33.9	35.6	35.6	35.5	33.1	35.1	34.4	34.4
Output: MEUI [kWh/(m2 * yr)]	70.9	71.9	70.4	72.1	72.1	72	69.6	71.6	70.9	70.9
Output: Better than ERS (%)	2240.0%	2180.0%	2250.0%	2180.0%	2180.0%	2180.0%	2290.0%	2200.0%	2240.0%	2240.0%
Output: Better than Envelope (%)	2320.0%	2050.0%	2410.0%	2050.0%	2050.0%	2050.0%	2590.0%	2140.0%	2320.0%	2320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1962	1894	1998	1879	1877	1882	2049	1915	1961	1959
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 276.66	$ 267.	$ 281.7	$ 265.	$ 264.63	$ 265.29	$ 288.87	$ 270.07	$ 276.5	$ 276.2
Annual savings in carbon tax for electricity [$/year]	$ .98	$ .95	$ 1.	$ .94	$ .94	$ .94	$ 1.02	$ .96	$ .98	$ .98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 277.64	$ 267.94	$ 282.7	$ 265.94	$ 265.57	$ 266.23	$ 289.89	$ 271.03	$ 277.48	$ 277.18
Annual savings in GHG from electricity savings [kg CO2e/year]	21.6	20.8	22	20.7	20.6	20.7	22.5	21.1	21.6	21.5
Annual savings in natural gas [m3/year]	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93
Annual savings in carbon tax for natural gas [$/year]	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9
Net Present Value [$]	$ 1,227.5	$ 1,406.38	$ 1,232.97	$ 1,583.03	$ 1,595.9	$ 1,591.5	$ 1,214.56	$ 1,587.96	$ 1,508.07	$ 1,519.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	9.99	8.6	14.09	14.09	8.6	9.99	8.6	14.09
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80	CeilR80	CeilR50	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 513.75	$ 513.75	$ 135.	$ 232.5	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	5.28	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 2,683.14	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 873.78	$ 1,008.79	$ 873.78	$ 873.78	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 5,505.13	$ 5,602.63	$ 6,055.13	$ 6,152.63	$ 6,355.13	$ 6,452.63	$ 6,378.91	$ 6,168.91	$ 6,476.41	$ 6,266.41
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 5,907.	$ 6,011.62	$ 6,497.15	$ 6,601.77	$ 6,819.05	$ 6,923.67	$ 6,844.57	$ 6,619.24	$ 6,949.19	$ 6,723.86
Net Present Value [$]	$ 6,154.15	$ 6,144.65	$ 5,841.98	$ 5,832.85	$ 5,694.34	$ 5,685.22	$ 5,292.23	$ 5,290.8	$ 5,282.74	$ 5,282.22
Incremental dollars per GHG saving	$ 111.44	$ 112.5	$ 57.5	$ 58.21	$ 45.04	$ 45.6	$ 128.87	$ 126.93	$ 129.79	$ 127.89
Auxiliary Energy Required Heating [GJ/yr]	7.9	7.8	8	7.8	8	7.8	7.9	8.2	7.8	8.1
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	12.4	11.7	11.7	13.5	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	7.9	7.8	8	7.8	8	7.8	7.9	8.2	7.8	8.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	47.7	47.5	46.6	46.5	45.9	45.8	47.6	47.9	47.5	47.8
Design Heating Load [W]	3517.9	3487.3	3517.9	3487.3	3517.9	3487.3	3517.5	3543.9	3486.8	3513.3
Annual Energy Electricity [kWh/yr]	9490.9	9456.7	9493.5	9459.2	9495.2	9460.9	9486.3	9568.4	9452.1	9533.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,279.65	$ 1,274.81	$ 1,280.02	$ 1,275.16	$ 1,280.26	$ 1,275.4	$ 1,279.	$ 1,290.61	$ 1,274.16	$ 1,285.73
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	332.9	314.2	314.2	362.1	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 143.6	$ 135.53	$ 135.53	$ 156.2	$ 156.2	$ 156.2	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	19951	20221	19953	20223	19955	20225	21463	20491	21841	20869
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200301031	Pkg2200201031	Pkg2200302031	Pkg2200202031
GHGI [kg/m2]	11.44	11.44	10.64	10.64	10.13	10.12	11.44	11.46	11.44	11.45
% ICC	2.8%	2.8%	3.0%	3.1%	3.2%	3.2%	3.2%	3.1%	3.3%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.7	31.2	31.7	31.2	31.7	31.2	31.6	32.8	31.1	32.3
Output: MEUI [kWh/(m2 * yr)]	87.8	87.3	83.5	83	80.7	80.3	87.7	88.9	87.2	88.4
Output: Better than ERS (%)	1600.0%	1640.0%	1800.0%	1810.0%	1920.0%	1940.0%	1620.0%	1570.0%	1640.0%	1580.0%
Output: Better than Envelope (%)	2950.0%	3040.0%	2860.0%	3040.0%	2860.0%	3040.0%	2950.0%	2680.0%	3040.0%	2770.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4530	4564	4527	4561	4525	4560	4534	4452	4568	4486
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 638.66	$ 643.48	$ 638.29	$ 643.13	$ 638.05	$ 642.89	$ 639.31	$ 627.73	$ 644.13	$ 632.6
Annual savings in carbon tax for electricity [$/year]	$ 2.26	$ 2.28	$ 2.26	$ 2.28	$ 2.26	$ 2.28	$ 2.27	$ 2.23	$ 2.28	$ 2.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 640.92	$ 645.76	$ 640.56	$ 645.41	$ 640.32	$ 645.17	$ 641.58	$ 629.96	$ 646.41	$ 634.84
Annual savings in GHG from electricity savings [kg CO2e/year]	49.8	50.2	49.8	50.2	49.8	50.2	49.9	49	50.3	49.4
Annual savings in natural gas [m3/year]	0.01	0.01	1.08	1.08	1.78	1.78	0.01	0.01	0.01	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ 10.01	$ 10.01	$ 16.47	$ 16.47	$ .07	$ .07	$ .07	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ 2.5	$ 2.5	$ 4.11	$ 4.11	$ .02	$ .02	$ .02	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ 12.51	$ 12.51	$ 20.58	$ 20.58	$ .09	$ .09	$ .09	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	55.5	55.5	91.3	91.3	0.4	0.4	0.4	0.4
Net Present Value [$]	$ 6,154.15	$ 6,144.65	$ 5,841.98	$ 5,832.85	$ 5,694.34	$ 5,685.22	$ 5,292.23	$ 5,290.8	$ 5,282.74	$ 5,282.22
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR14	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 873.78	$ 663.78	$ 873.78	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$.	$.

LANEWAY Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 12,396.27	$ 12,493.77	$ 12,531.28	$ 12,565.02	$ 12,628.78	$ 12,686.27	$ 12,775.02	$ 12,783.77	$ 12,842.67	$ 12,896.27
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 13,301.2	$ 13,405.82	$ 13,446.06	$ 13,482.27	$ 13,550.68	$ 13,612.37	$ 13,707.6	$ 13,716.99	$ 13,780.18	$ 13,837.7
Net Present Value [$]	$ 91.92	$ 158.02	$ 342.69	$ 252.27	$ 408.6	$ 265.25	$ 456.43	$ 334.63	$ 621.58	$ 495.52
Incremental dollars per GHG saving	$ 237.48	$ 238.89	$ 242.39	$ 240.71	$ 243.8	$ 240.73	$ 244.73	$ 242.12	$ 247.93	$ 245.18
Auxiliary Energy Required Heating [GJ/yr]	5.6	5.5	5.4	5.6	5.3	5.4	5.3	5.2	5.6	5.1
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	2.6	2.5	2.5	2.6	2.4	2.4	2.5	2.4	2.7	2.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	46.7	46.7	46.9	46.7	46.9	46.6	46.7	46.5	46.9	46.6
Design Heating Load [W]	2617.3	2586.7	2592.7	2595.2	2562	2614.5	2568.7	2583.9	2696	2588
Annual Energy Electricity [kWh/yr]	9240.3	9228.1	9285.3	9237.1	9273	9195	9234.8	9184.1	9272.7	9202.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,244.19	$ 1,242.46	$ 1,250.55	$ 1,243.73	$ 1,248.81	$ 1,237.78	$ 1,243.41	$ 1,236.24	$ 1,248.77	$ 1,238.9
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	27530	27746	28178	27314	28394	26900	27962	27116	26684	27548
Upgrade Package List	Pkg3300301033	Pkg3300302033	Pkg3300401033	Pkg3300203033	Pkg3300402033	Pkg3300201034	Pkg3300303033	Pkg3300202034	Pkg3200403034	Pkg3300301034
GHGI [kg/m2]	11.41	11.41	11.41	11.41	11.41	11.41	11.41	11.41	11.41	11.4
% ICC	6.2%	6.3%	6.3%	6.3%	6.4%	6.4%	6.4%	6.4%	6.5%	6.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.5	22.1	21.5	22.3	21.1	21.4	21.3	20.9	22.4	20.3
Output: MEUI [kWh/(m2 * yr)]	81.8	81.7	82.3	81.8	82.1	81.2	81.7	81	82.3	81.3
Output: Better than ERS (%)	2380.0%	2380.0%	2350.0%	2380.0%	2350.0%	2400.0%	2380.0%	2410.0%	2350.0%	2400.0%
Output: Better than Envelope (%)	5000.0%	5090.0%	5180.0%	5000.0%	5270.0%	5180.0%	5270.0%	5360.0%	5000.0%	5450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4780	4792	4735	4783	4747	4825	4786	4836	4748	4818
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 673.99	$ 675.71	$ 667.65	$ 674.45	$ 669.38	$ 680.38	$ 674.77	$ 681.92	$ 669.43	$ 679.27
Annual savings in carbon tax for electricity [$/year]	$ 2.39	$ 2.4	$ 2.37	$ 2.39	$ 2.37	$ 2.41	$ 2.39	$ 2.42	$ 2.37	$ 2.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 676.38	$ 678.11	$ 670.02	$ 676.84	$ 671.76	$ 682.79	$ 677.16	$ 684.34	$ 671.8	$ 681.68
Annual savings in GHG from electricity savings [kg CO2e/year]	52.6	52.7	52.1	52.6	52.2	53.1	52.6	53.2	52.2	53
Annual savings in natural gas [m3/year]	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Net Present Value [$]	$ 91.92	$ 158.02	$ 342.69	$ 252.27	$ 408.6	$ 265.25	$ 456.43	$ 334.63	$ 621.58	$ 495.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	14.09	9.99	8.6	14.09	9.99	14.09	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR80	CeilR60	CeilR50	CeilR80	CeilR60	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 513.75	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 873.78	$ 1,008.79	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 663.78	$ 1,008.79	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,886.5	$ 13,943.99	$ 14,032.74	$ 14,041.49	$ 14,153.99	$ 14,167.75	$ 14,251.49	$ 14,289.	$ 14,301.49	$ 14,339.
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 14,900.21	$ 14,961.9	$ 15,057.13	$ 15,066.52	$ 15,187.23	$ 15,202.	$ 15,291.85	$ 15,332.1	$ 15,345.5	$ 15,385.75
Net Present Value [$]	$ 3,610.88	$ 3,718.03	$ 3,789.26	$ 3,731.36	$ 3,731.57	$ 3,740.59	$ 3,746.	$ 3,688.2	$ 3,659.79	$ 3,597.61
Incremental dollars per GHG saving	$ 19.18	$ 19.27	$ 19.39	$ 19.39	$ 19.54	$ 19.56	$ 19.66	$ 19.7	$ 19.72	$ 19.76
Auxiliary Energy Required Heating [GJ/yr]	5.6	5.6	5.6	5.5	5.4	5.3	5.2	5.1	5.6	5.5
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.1	7.1
Annual Energy Space Heating [GJ/yr]	5.6	5.6	5.6	5.5	5.4	5.3	5.2	5.1	5.6	5.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	40.3	40.4	40.4	40.3	40.1	40.1	40	39.9	39.8	39.7
Design Heating Load [W]	2239.4	2291.8	2246	2261.2	2265.4	2221.4	2234.7	2240.7	2264	2270
Annual Energy Electricity [kWh/yr]	11206.5	11225.8	11219	11193.1	11149.5	11147.6	11117.2	11080.2	11064.3	11025.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,522.4	$ 1,525.14	$ 1,524.17	$ 1,520.51	$ 1,514.34	$ 1,514.07	$ 1,509.77	$ 1,504.53	$ 1,502.28	$ 1,496.81
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	28507	27013	28075	27229	27661	28723	27877	28309	27861	28293
Upgrade Package List	Pkg3300402053	Pkg3300201054	Pkg3300303053	Pkg3300202054	Pkg3300301054	Pkg3300403053	Pkg3300302054	Pkg3300401054	Pkg3300302053	Pkg3300401053
GHGI [kg/m2]	1.77	1.77	1.77	1.77	1.76	1.76	1.75	1.75	1.75	1.74
% ICC	7.0%	7.0%	7.1%	7.1%	7.1%	7.1%	7.2%	7.2%	7.2%	7.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.2	22.4	22.3	22	21.3	21.3	20.9	20.3	22.3	21.7
Output: MEUI [kWh/(m2 * yr)]	58.7	58.9	58.8	58.5	57.8	57.8	57.4	56.9	56.6	56.1
Output: Better than ERS (%)	2790.0%	2770.0%	2770.0%	2790.0%	2830.0%	2830.0%	2840.0%	2860.0%	2880.0%	2900.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5090.0%	5180.0%	5270.0%	5360.0%	5450.0%	5000.0%	5090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2814	2795	2801	2827	2871	2873	2903	2940	2956	2995
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 396.76	$ 394.04	$ 395.	$ 398.65	$ 404.8	$ 405.06	$ 409.35	$ 414.57	$ 416.81	$ 422.27
Annual savings in carbon tax for electricity [$/year]	$ 1.41	$ 1.4	$ 1.4	$ 1.41	$ 1.44	$ 1.44	$ 1.45	$ 1.47	$ 1.48	$ 1.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 398.17	$ 395.44	$ 396.4	$ 400.06	$ 406.23	$ 406.5	$ 410.8	$ 416.04	$ 418.29	$ 423.76
Annual savings in GHG from electricity savings [kg CO2e/year]	31	30.7	30.8	31.1	31.6	31.6	31.9	32.3	32.5	32.9
Annual savings in natural gas [m3/year]	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93	$ 124.93
Annual savings in carbon tax for natural gas [$/year]	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18	$ 31.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11	$ 156.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9	692.9
Net Present Value [$]	$ 3,610.88	$ 3,718.03	$ 3,789.26	$ 3,731.36	$ 3,731.57	$ 3,740.59	$ 3,746.	$ 3,688.2	$ 3,659.79	$ 3,597.61
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	14.09	9.99	8.6	14.09	9.99	8.6	9.99	8.6
Attic Ceiling Code	CeilR60	CeilR50	CeilR80	CeilR60	CeilR50	CeilR80	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 663.78	$ 873.78	$ 663.78	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

LANEWAY Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 12,396.27	$ 12,493.77	$ 12,565.02	$ 12,686.27	$ 12,783.77	$ 12,531.28	$ 12,628.78	$ 12,775.02	$ 13,043.77	$ 12,896.27
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 13,301.2	$ 13,405.82	$ 13,482.27	$ 13,612.37	$ 13,716.99	$ 13,446.06	$ 13,550.68	$ 13,707.6	$ 13,995.97	$ 13,837.7
Net Present Value [$]	$ 91.92	$ 158.02	$ 252.27	$ 265.25	$ 334.63	$ 342.69	$ 408.6	$ 456.43	$ 464.71	$ 495.52
Incremental dollars per GHG saving	$ 237.48	$ 238.89	$ 240.71	$ 240.73	$ 242.12	$ 242.39	$ 243.8	$ 244.73	$ 120.55	$ 245.18
Auxiliary Energy Required Heating [GJ/yr]	5.6	5.5	5.6	5.4	5.2	5.4	5.3	5.3	5.5	5.1
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5
Annual Energy Space Heating [GJ/yr]	2.6	2.5	2.6	2.4	2.4	2.5	2.4	2.5	2.5	2.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	46.7	46.7	46.7	46.6	46.5	46.9	46.9	46.7	45.6	46.6
Design Heating Load [W]	2617.3	2586.7	2595.2	2614.5	2583.9	2592.7	2562	2568.7	2586.7	2588
Annual Energy Electricity [kWh/yr]	9240.3	9228.1	9237.1	9195	9184.1	9285.3	9273	9234.8	9228.6	9202.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,244.19	$ 1,242.46	$ 1,243.73	$ 1,237.78	$ 1,236.24	$ 1,250.55	$ 1,248.81	$ 1,243.41	$ 1,242.53	$ 1,238.9
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	332.9	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	27530	27746	27314	26900	27116	28178	28394	27962	27748	27548
Upgrade Package List	Pkg3300301033	Pkg3300302033	Pkg3300203033	Pkg3300201034	Pkg3300202034	Pkg3300401033	Pkg3300402033	Pkg3300303033	Pkg3300302033	Pkg3300301034
GHGI [kg/m2]	11.41	11.4	11.4	11.4	11.4	11.41	11.41	11.4	10.6	11.4
% ICC	6.2%	6.3%	6.3%	6.4%	6.4%	6.3%	6.4%	6.4%	6.6%	6.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.5	22.1	22.3	21.4	20.9	21.5	21.1	21.3	22.1	20.3
Output: MEUI [kWh/(m2 * yr)]	81.8	81.7	81.8	81.2	81	82.3	82.1	81.7	77.3	81.3
Output: Better than ERS (%)	2380.0%	2380.0%	2380.0%	2400.0%	2410.0%	2350.0%	2350.0%	2380.0%	2560.0%	2400.0%
Output: Better than Envelope (%)	5000.0%	5090.0%	5000.0%	5180.0%	5360.0%	5180.0%	5270.0%	5270.0%	5090.0%	5450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4780	4792	4783	4825	4836	4735	4747	4786	4792	4818
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 673.99	$ 675.71	$ 674.45	$ 680.38	$ 681.92	$ 667.65	$ 669.38	$ 674.77	$ 675.64	$ 679.27
Annual savings in carbon tax for electricity [$/year]	$ 2.39	$ 2.4	$ 2.39	$ 2.41	$ 2.42	$ 2.37	$ 2.37	$ 2.39	$ 2.4	$ 2.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 676.38	$ 678.11	$ 676.84	$ 682.79	$ 684.34	$ 670.02	$ 671.76	$ 677.16	$ 678.04	$ 681.68
Annual savings in GHG from electricity savings [kg CO2e/year]	52.6	52.7	52.6	53.1	53.2	52.1	52.2	52.6	52.7	53
Annual savings in natural gas [m3/year]	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.08	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ .07	$ 10.01	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ .02	$ 2.5	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ 12.51	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	55.5	0.4
Net Present Value [$]	$ 91.92	$ 158.02	$ 252.27	$ 265.25	$ 334.63	$ 342.69	$ 408.6	$ 456.43	$ 464.71	$ 495.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	14.09	8.6	9.99	8.6	9.99	14.09	9.99	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 513.75	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 513.75	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 873.78	$ 663.78	$ 663.78	$ 663.78	$ 1,008.79	$ 1,008.79	$ 873.78	$ 873.78	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

LANEWAY Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 5,005.13	$ 5,102.63	$ 5,505.13	$ 5,555.13	$ 5,586.13	$ 5,602.63	$ 5,652.63	$ 5,668.91	$ 5,683.63	$ 5,766.41
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 5,635.78	$ 5,745.56	$ 6,198.78	$ 6,255.08	$ 6,289.98	$ 6,308.56	$ 6,364.86	$ 6,383.19	$ 6,399.77	$ 6,492.98
Net Present Value [$]	$ 10,348.08	$ 10,372.	$ 10,588.83	$ 10,060.23	$ 9,759.41	$ 10,611.1	$ 10,083.97	$ 9,452.96	$ 9,787.35	$ 9,476.88
Incremental dollars per GHG saving	$ 76.53	$ 77.43	$ 80.25	$ 43.64	$ 85.42	$ 81.08	$ 44.23	$ 88.03	$ 86.25	$ 88.85
Auxiliary Energy Required Heating [GJ/yr]	14	13.9	13	14	14	12.8	13.9	14.3	13.9	14.2
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	14.3	13	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	14	13.9	13	14	14	12.8	13.9	14.3	13.9	14.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	54.5	54.3	53.5	53.3	54.5	53.3	53.1	54.8	54.3	54.7
Design Heating Load [W]	4801.8	4762.1	4565	4801.8	4565	4525.3	4762.1	4827.9	4525.3	4788.2
Annual Energy Electricity [kWh/yr]	11179.6	11132.5	10891.9	11182.9	11182.6	10845.4	11135.8	11269.5	11133.9	11222.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,518.6	$ 1,511.93	$ 1,477.89	$ 1,519.07	$ 1,519.02	$ 1,471.31	$ 1,512.4	$ 1,531.32	$ 1,512.13	$ 1,524.64
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	382.7	382.7	350.4	382.7	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1735	2005	4975	1737	4921	5245	2007	2275	5191	2545
Upgrade Package List	Pkg1200101031	Pkg1200102031	Pkg2200101031	Pkg1200101031	Pkg2200101021	Pkg2200102031	Pkg1200102031	Pkg1200201031	Pkg2200102021	Pkg1200202031
GHGI [kg/m2]	12.28	12.27	12.23	11.39	12.28	12.22	11.38	12.29	12.27	12.28
% ICC	2.5%	2.6%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	55.9	55.2	51.8	55.9	55.9	51.1	55.3	57.2	55.2	56.5
Output: MEUI [kWh/(m2 * yr)]	115.1	114.4	111	110.3	115.1	110.3	109.7	116.4	114.4	115.7
Output: Better than ERS (%)	1790.0%	1820.0%	1940.0%	1970.0%	1790.0%	1970.0%	2000.0%	1750.0%	1820.0%	1760.0%
Output: Better than Envelope (%)	1140.0%	1200.0%	1770.0%	1140.0%	1140.0%	1900.0%	1200.0%	950.0%	1200.0%	1010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5964	6011	6252	5961	5961	6298	6008	5874	6010	5921
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 840.92	$ 847.57	$ 881.49	$ 840.46	$ 840.5	$ 888.05	$ 847.1	$ 828.25	$ 847.37	$ 834.9
Annual savings in carbon tax for electricity [$/year]	$ 2.98	$ 3.01	$ 3.13	$ 2.98	$ 2.98	$ 3.15	$ 3.	$ 2.94	$ 3.	$ 2.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 843.91	$ 850.57	$ 884.62	$ 843.44	$ 843.48	$ 891.2	$ 850.1	$ 831.19	$ 850.37	$ 837.86
Annual savings in GHG from electricity savings [kg CO2e/year]	65.6	66.1	68.8	65.6	65.6	69.3	66.1	64.6	66.1	65.1
Annual savings in natural gas [m3/year]	0	0	0	1.2	0	0	1.2	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ 11.12	$ .03	$ .03	$ 11.12	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ 2.77	$ .01	$ .01	$ 2.77	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ 13.89	$ .04	$ .04	$ 13.89	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	61.7	0.2	0.2	61.7	0.2	0.2	0.2
Net Present Value [$]	$ 10,348.08	$ 10,372.	$ 10,588.83	$ 10,060.23	$ 9,759.41	$ 10,611.1	$ 10,083.97	$ 9,452.96	$ 9,787.35	$ 9,476.88
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	8.6	9.99	9.99	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$.	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$.	$.

LANEWAY Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC Effr20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC Effr20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC Effr10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 8,726.63	$ 8,929.13	$ 9,026.63	$ 9,080.27	$ 9,087.92	$ 9,177.77	$ 9,185.42	$ 9,215.28	$ 9,242.91	$ 9,249.02
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,826.19	$ 10,054.2	$ 10,163.99	$ 10,224.38	$ 10,233.	$ 10,334.17	$ 10,342.78	$ 10,376.41	$ 10,407.52	$ 10,414.4
Net Present Value [$]	$ 3,525.33	$ 3,632.12	$ 3,658.05	$ 2,730.19	$ 2,722.36	$ 2,756.49	$ 2,748.29	$ 2,877.83	$ 2,589.65	$ 2,609.65
Incremental dollars per GHG saving	$ 11.31	$ 11.56	$ 11.68	$ 11.8	$ 11.81	$ 11.92	$ 11.93	$ 11.96	$ 12.01	$ 12.02
Auxiliary Energy Required Heating [GJ/yr]	14.5	14.5	14.3	14.5	14.5	14.3	14.3	14.1	14.5	14.5
Annual Energy DHW [GJ/yr]	7.4	7	7	8	8	8	8	8	8	8
Annual Energy Space Heating [GJ/yr]	14.5	14.5	14.3	14.5	14.5	14.3	14.3	14.1	14.5	14.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	49.1	48.6	48.5	49.7	49.7	49.5	49.5	49.3	49.7	49.6
Design Heating Load [W]	3650.9	3690.7	3650.9	3629	3658.7	3589.3	3619	3601	3678.7	3595.9
Annual Energy Electricity [kWh/yr]	13629.4	13509.3	13461.3	13800.9	13801	13752.8	13753	13691.1	13792.3	13782.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,865.25	$ 1,848.25	$ 1,841.46	$ 1,889.51	$ 1,889.53	$ 1,882.71	$ 1,882.73	$ 1,873.98	$ 1,888.3	$ 1,886.87
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	5289	5021	5291	8653	7375	8869	7591	9301	5575	8437
Upgrade Package List	Pkg2200102033	Pkg2200101033	Pkg2200102033	Pkg2300301032	Pkg2200401033	Pkg2300302032	Pkg2200402033	Pkg2300401032	Pkg2200201034	Pkg2300203032
GHGI [kg/m2]	2.15	2.13	2.12	2.18	2.18	2.17	2.17	2.16	2.18	2.18
% ICC	4.4%	4.5%	4.5%	4.6%	4.6%	4.6%	4.6%	4.6%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.8	57.7	57	57.9	57.9	57.2	57.2	56.3	57.7	57.6
Output: MEUI [kWh/(m2 * yr)]	93.4	91.7	91	95.9	95.9	95.2	95.2	94.3	95.8	95.6
Output: Better than ERS (%)	2480.0%	2560.0%	2570.0%	2390.0%	2390.0%	2420.0%	2420.0%	2450.0%	2390.0%	2400.0%
Output: Better than Envelope (%)	820.0%	820.0%	950.0%	820.0%	820.0%	950.0%	950.0%	1080.0%	820.0%	820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3514	3634	3682	3343	3343	3391	3391	3452	3351	3361
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 495.5	$ 512.44	$ 519.2	$ 471.32	$ 471.31	$ 478.1	$ 478.07	$ 486.8	$ 472.53	$ 473.96
Annual savings in carbon tax for electricity [$/year]	$ 1.76	$ 1.82	$ 1.84	$ 1.67	$ 1.67	$ 1.7	$ 1.7	$ 1.73	$ 1.68	$ 1.68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 497.26	$ 514.25	$ 521.05	$ 472.99	$ 472.98	$ 479.8	$ 479.77	$ 488.53	$ 474.21	$ 475.64
Annual savings in GHG from electricity savings [kg CO2e/year]	38.7	40	40.5	36.8	36.8	37.3	37.3	38	36.9	37
Annual savings in natural gas [m3/year]	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08
Annual savings in carbon tax for natural gas [$/year]	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6
Net Present Value [$]	$ 3,525.33	$ 3,632.12	$ 3,658.05	$ 2,730.19	$ 2,722.36	$ 2,756.49	$ 2,748.29	$ 2,877.83	$ 2,589.65	$ 2,609.65
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	8.6	9.99	9.99	8.6	8.6	14.09
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	7.04	5.28	7.04	5.28	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 663.78	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,155.13	$ 8,252.63	$ 8,655.13	$ 8,752.63	$ 8,705.13	$ 8,802.63	$ 9,005.13	$ 8,736.13	$ 9,102.63	$ 9,205.13
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,182.68	$ 9,292.46	$ 9,745.68	$ 9,855.46	$ 9,801.98	$ 9,911.76	$ 10,139.78	$ 9,836.88	$ 10,249.56	$ 10,364.98
Net Present Value [$]	$ 11,384.39	$ 11,322.49	$ 11,194.24	$ 11,125.22	$ 11,107.86	$ 11,040.49	$ 10,981.89	$ 10,946.35	$ 10,914.34	$ 10,911.86
Incremental dollars per GHG saving	$ 97.9	$ 98.95	$ 102.31	$ 103.34	$ 59.95	$ 60.58	$ 48.57	$ 104.13	$ 49.07	$ 62.83
Auxiliary Energy Required Heating [GJ/yr]	14	13.9	13	12.8	14	13.9	14	14	13.9	13
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	13	12.3	14.3	12.3	13
Annual Energy Space Heating [GJ/yr]	6.3	6.2	5.9	5.8	6.3	6.2	6.3	6.1	6.2	5.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	48.6	48.6	48.2	48.2	47.4	47.4	46.7	48.4	46.6	47
Design Heating Load [W]	4852.5	4812.7	4599.4	4559.7	4852.5	4812.7	4852.5	4599.4	4812.7	4599.4
Annual Energy Electricity [kWh/yr]	9553.5	9539.7	9433.2	9422.1	9552.4	9540.7	9553	9498	9541.4	9434.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,288.51	$ 1,286.55	$ 1,271.48	$ 1,269.91	$ 1,288.35	$ 1,286.69	$ 1,288.43	$ 1,280.65	$ 1,286.79	$ 1,271.64
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	350.4	350.4	329.4	382.7	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 151.15	$ 142.09	$ 165.08	$ 142.09	$ 151.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1736	2006	4976	5246	1738	2008	1740	4922	2010	4978
Upgrade Package List	Pkg1200101031	Pkg1200102031	Pkg2200101031	Pkg2200102031	Pkg1200101031	Pkg1200102031	Pkg1200101031	Pkg2200101021	Pkg1200102031	Pkg2200101031
GHGI [kg/m2]	12.02	12.02	12	12	11.13	11.13	10.56	12.01	10.55	11.11
% ICC	4.1%	4.2%	4.4%	4.4%	4.4%	4.4%	4.5%	4.4%	4.6%	4.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55.9	55.2	51.8	51.1	55.9	55.3	56	55.9	55.3	51.8
Output: MEUI [kWh/(m2 * yr)]	90.5	90.3	88.8	88.6	85.7	85.5	82.6	89.9	82.4	84
Output: Better than ERS (%)	3030.0%	3030.0%	3080.0%	3080.0%	3200.0%	3200.0%	3300.0%	3060.0%	3310.0%	3260.0%
Output: Better than Envelope (%)	1140.0%	1200.0%	1770.0%	1900.0%	1140.0%	1200.0%	1140.0%	1140.0%	1200.0%	1770.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7590	7604	7710	7722	7591	7603	7591	7646	7602	7709
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,070.2	$ 1,072.15	$ 1,087.17	$ 1,088.73	$ 1,070.36	$ 1,072.01	$ 1,070.27	$ 1,078.03	$ 1,071.91	$ 1,087.01
Annual savings in carbon tax for electricity [$/year]	$ 3.8	$ 3.8	$ 3.86	$ 3.86	$ 3.8	$ 3.8	$ 3.8	$ 3.82	$ 3.8	$ 3.85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,074.	$ 1,075.95	$ 1,091.02	$ 1,092.59	$ 1,074.15	$ 1,075.81	$ 1,074.07	$ 1,081.85	$ 1,075.71	$ 1,090.87
Annual savings in GHG from electricity savings [kg CO2e/year]	83.5	83.6	84.8	84.9	83.5	83.6	83.5	84.1	83.6	84.8
Annual savings in natural gas [m3/year]	0	0	0	0	1.2	1.2	1.98	0	1.98	1.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ 11.12	$ 11.12	$ 18.36	$ .03	$ 18.36	$ 11.12
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ 2.77	$ 2.77	$ 4.58	$ .01	$ 4.58	$ 2.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ 13.89	$ 13.89	$ 22.95	$ .04	$ 22.95	$ 13.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	61.7	61.7	101.9	0.2	101.9	61.7
Net Present Value [$]	$ 11,384.39	$ 11,322.49	$ 11,194.24	$ 11,125.22	$ 11,107.86	$ 11,040.49	$ 10,981.89	$ 10,946.35	$ 10,914.34	$ 10,911.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	8.6	9.99	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$ 550.

LANEWAY Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R-30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationSlabOnGrade=>BC Effr10 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R-30 eff Opt FoundationSlabOnGrade=>BC Effr10 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,605.13	$ 8,686.13	$ 8,702.63	$ 8,783.63	$ 8,905.13	$ 8,986.13	$ 9,002.63	$ 9,083.63	$ 9,268.91	$ 9,349.91
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,689.38	$ 9,780.58	$ 9,799.16	$ 9,890.37	$ 10,027.18	$ 10,118.38	$ 10,136.96	$ 10,228.17	$ 10,436.79	$ 10,528.
Net Present Value [$]	$ 9,576.	$ 9,407.94	$ 9,522.5	$ 9,353.9	$ 9,482.01	$ 9,314.92	$ 9,428.51	$ 9,260.88	$ 8,824.21	$ 8,664.37
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	10.9	11.8	10.7	11.6	10.9	11.8	10.7	11.6	11.2	12.1
Annual Energy DHW [GJ/yr]	22.6	22.6	22.6	22.6	21.7	21.7	21.7	21.7	22.6	22.6
Annual Energy Space Heating [GJ/yr]	5.1	5.3	5	5.2	5.1	5.3	5	5.2	5.2	5.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	56.3	56.4	56.2	56.4	55.3	55.5	55.3	55.4	56.4	56.5
Design Heating Load [W]	4807.9	4807.9	4768.2	4768.2	4807.9	4807.9	4768.2	4768.2	4834	4834
Annual Energy Electricity [kWh/yr]	9352.3	9381.9	9335.2	9365	9352.3	9381.9	9335.2	9365	9386.5	9412.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,260.04	$ 1,264.22	$ 1,257.62	$ 1,261.83	$ 1,260.04	$ 1,264.22	$ 1,257.62	$ 1,261.83	$ 1,264.87	$ 1,268.61
Annual Energy Natural Gas [m3/yr]	606.7	608	606.7	608	582.1	583.3	582.1	583.3	606.7	608
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 261.71	$ 262.27	$ 261.71	$ 262.27	$ 251.1	$ 251.62	$ 251.1	$ 251.62	$ 261.71	$ 262.27
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	4972	4918	5242	5188	4974	4920	5244	5190	5512	5458
Upgrade Package List	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200102021	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200102021	Pkg2200201031	Pkg2200201021
GHGI [kg/m2]	18.14	18.18	18.14	18.18	17.47	17.5	17.46	17.5	18.15	18.19
% ICC	4.3%	4.4%	4.4%	4.4%	4.5%	4.5%	4.5%	4.6%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	43.2	46.9	42.6	46.3	43.2	46.9	42.6	46.3	44.4	48.2
Output: MEUI [kWh/(m2 * yr)]	120.5	121.5	120.3	121.3	116.8	117.8	116.6	117.6	121	121.9
Output: Better than ERS (%)	2550.0%	2540.0%	2570.0%	2540.0%	2690.0%	2660.0%	2690.0%	2670.0%	2540.0%	2530.0%
Output: Better than Envelope (%)	3100.0%	2530.0%	3230.0%	2660.0%	3100.0%	2530.0%	3230.0%	2660.0%	2910.0%	2340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7791	7762	7808	7779	7791	7762	7808	7779	7757	7731
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,098.57	$ 1,094.4	$ 1,100.98	$ 1,096.78	$ 1,098.57	$ 1,094.4	$ 1,100.98	$ 1,096.78	$ 1,093.75	$ 1,090.03
Annual savings in carbon tax for electricity [$/year]	$ 3.9	$ 3.88	$ 3.9	$ 3.89	$ 3.9	$ 3.88	$ 3.9	$ 3.89	$ 3.88	$ 3.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,102.47	$ 1,098.28	$ 1,104.89	$ 1,100.67	$ 1,102.47	$ 1,098.28	$ 1,104.89	$ 1,100.67	$ 1,097.63	$ 1,093.89
Annual savings in GHG from electricity savings [kg CO2e/year]	85.7	85.4	85.9	85.6	85.7	85.4	85.9	85.6	85.3	85
Annual savings in natural gas [m3/year]	8.35	8.4	8.35	8.4	7.43	7.48	7.43	7.48	8.35	8.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 77.36	$ 77.81	$ 77.36	$ 77.81	$ 68.87	$ 69.28	$ 68.87	$ 69.28	$ 77.36	$ 77.81
Annual savings in carbon tax for natural gas [$/year]	$ 19.31	$ 19.42	$ 19.31	$ 19.42	$ 17.19	$ 17.29	$ 17.19	$ 17.29	$ 19.31	$ 19.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 96.67	$ 97.23	$ 96.67	$ 97.23	$ 86.06	$ 86.57	$ 86.06	$ 86.57	$ 96.67	$ 97.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	429.1	431.6	429.1	431.6	382	384.3	382	384.3	429.1	431.6
Net Present Value [$]	$ 9,576.	$ 9,407.94	$ 9,522.5	$ 9,353.9	$ 9,482.01	$ 9,314.92	$ 9,428.51	$ 9,260.88	$ 8,824.21	$ 8,664.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	8.6	9.99	9.99	8.6	8.6	9.99	9.99	8.6	8.6
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.25
Window Cost of Upgrade	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99
Above Grade Wall Code	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.

LANEWAY Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 9,752.78	$ 9,907.77	$ 10,020.27	$ 10,034.03	$ 10,117.77	$ 10,117.77	$ 10,155.28	$ 10,155.28	$ 10,205.28	$ 10,189.02
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 10,981.63	$ 11,156.15	$ 11,282.82	$ 11,298.32	$ 11,392.61	$ 11,392.61	$ 11,434.85	$ 11,434.85	$ 11,491.15	$ 11,472.84
Net Present Value [$]	$ 3,417.03	$ 3,287.42	$ 3,341.8	$ 3,354.88	$ 3,364.81	$ 3,078.33	$ 3,475.56	$ 3,192.19	$ 3,497.5	$ 3,225.82
Incremental dollars per GHG saving	$ 12.58	$ 12.78	$ 12.91	$ 12.93	$ 13.03	$ 13.05	$ 13.07	$ 13.09	$ 13.13	$ 13.13
Auxiliary Energy Required Heating [GJ/yr]	12.6	12.6	12.4	12.3	12.2	12.6	12	12.4	12.5	12.3
Annual Energy DHW [GJ/yr]	8	8	8	8	8	8	8	8	7.4	8
Annual Energy Space Heating [GJ/yr]	12.6	12.6	12.4	12.3	12.2	12.6	12	12.4	12.5	12.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	47.8	47.7	47.5	47.5	47.3	47.7	47.1	47.5	47	47.4
Design Heating Load [W]	3383.8	3403.8	3413.6	3360.5	3373.9	3313.5	3385.5	3325.2	3423.6	3380.5
Annual Energy Electricity [kWh/yr]	13272.9	13263	13198.2	13187.8	13151.4	13262.7	13093.8	13203.9	13065.9	13177.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,814.8	$ 1,813.4	$ 1,804.23	$ 1,802.76	$ 1,797.61	$ 1,813.36	$ 1,789.46	$ 1,805.04	$ 1,785.51	$ 1,801.33
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	9535	8257	8689	9751	8905	12775	9337	13207	9321	8473
Upgrade Package List	Pkg2300402033	Pkg2300202034	Pkg2300301034	Pkg2300403033	Pkg2300302034	Pkg3300302033	Pkg2300401034	Pkg3300401033	Pkg2300401033	Pkg2300203034
GHGI [kg/m2]	2.09	2.09	2.08	2.08	2.08	2.09	2.07	2.08	2.06	2.08
% ICC	4.9%	5.0%	5.0%	5.0%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	50.3	50.2	49.2	49.1	48.6	50.1	47.7	49.3	49.7	48.9
Output: MEUI [kWh/(m2 * yr)]	88.3	88.2	87.2	87.1	86.6	88.2	85.7	87.3	85.3	86.9
Output: Better than ERS (%)	2680.0%	2700.0%	2730.0%	2730.0%	2760.0%	2700.0%	2790.0%	2730.0%	2800.0%	2740.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2150.0%	2220.0%	2280.0%	2030.0%	2410.0%	2150.0%	2090.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3871	3881	3945	3956	3992	3881	4050	3940	4078	3966
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 545.77	$ 547.16	$ 556.3	$ 557.77	$ 562.9	$ 547.21	$ 571.02	$ 555.5	$ 574.96	$ 559.19
Annual savings in carbon tax for electricity [$/year]	$ 1.94	$ 1.94	$ 1.97	$ 1.98	$ 2.	$ 1.94	$ 2.02	$ 1.97	$ 2.04	$ 1.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 547.7	$ 549.1	$ 558.27	$ 559.75	$ 564.9	$ 549.15	$ 573.05	$ 557.47	$ 576.99	$ 561.17
Annual savings in GHG from electricity savings [kg CO2e/year]	42.6	42.7	43.4	43.5	43.9	42.7	44.5	43.3	44.9	43.6
Annual savings in natural gas [m3/year]	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08
Annual savings in carbon tax for natural gas [$/year]	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6
Net Present Value [$]	$ 3,417.03	$ 3,287.42	$ 3,341.8	$ 3,354.88	$ 3,364.81	$ 3,078.33	$ 3,475.56	$ 3,192.19	$ 3,497.5	$ 3,225.82
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	9.99	8.6	14.09	9.99	9.99	8.6	8.6	8.6	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 232.5	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 663.78	$ 873.78	$ 1,008.79	$ 873.78	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 663.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

LANEWAY Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,605.13	$ 8,702.63	$ 8,905.13	$ 9,002.63	$ 8,686.13	$ 8,783.63	$ 8,986.13	$ 9,083.63	$ 10,455.13	$ 10,552.63
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,689.38	$ 9,799.16	$ 10,027.18	$ 10,136.96	$ 9,780.58	$ 9,890.37	$ 10,118.38	$ 10,228.17	$ 11,772.48	$ 11,882.26
Net Present Value [$]	$ 9,576.	$ 9,522.5	$ 9,482.01	$ 9,428.51	$ 9,407.94	$ 9,353.9	$ 9,314.92	$ 9,260.88	$ 8,992.73	$ 8,929.56
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 126.12	$ 127.14
Auxiliary Energy Required Heating [GJ/yr]	10.9	10.7	10.9	10.7	11.8	11.6	11.8	11.6	11.8	11.7
Annual Energy DHW [GJ/yr]	22.6	22.6	21.7	21.7	22.6	22.6	21.7	21.7	14.3	14.3
Annual Energy Space Heating [GJ/yr]	5.1	5	5.1	5	5.3	5.2	5.3	5.2	5.3	5.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.5	1.5
Total Energy [GJ/yr]	56.3	56.2	55.3	55.3	56.4	56.4	55.5	55.4	48.8	48.7
Design Heating Load [W]	4807.9	4768.2	4807.9	4768.2	4807.9	4768.2	4807.9	4768.2	3725.1	3685.3
Annual Energy Electricity [kWh/yr]	9352.3	9335.2	9352.3	9335.2	9381.9	9365	9381.9	9365	9589.1	9575.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,260.04	$ 1,257.62	$ 1,260.04	$ 1,257.62	$ 1,264.22	$ 1,261.83	$ 1,264.22	$ 1,261.83	$ 1,293.54	$ 1,291.66
Annual Energy Natural Gas [m3/yr]	606.7	606.7	582.1	582.1	608	608	583.3	583.3	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 261.71	$ 261.71	$ 251.1	$ 251.1	$ 262.27	$ 262.27	$ 251.62	$ 251.62	$ 165.08	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	4972	5242	4974	5244	4918	5188	4920	5190	5012	5282
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101021	Pkg2200102021	Pkg2200101021	Pkg2200102021	Pkg2200101033	Pkg2200102033
GHGI [kg/m2]	18.14	18.14	17.47	17.46	18.18	18.18	17.5	17.5	12.03	12.02
% ICC	4.3%	4.4%	4.5%	4.5%	4.4%	4.4%	4.5%	4.6%	5.3%	5.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.2	42.6	43.2	42.6	46.9	46.3	46.9	46.3	47.1	46.4
Output: MEUI [kWh/(m2 * yr)]	120.5	120.3	116.8	116.6	121.5	121.3	117.8	117.6	90.9	90.7
Output: Better than ERS (%)	2550.0%	2570.0%	2690.0%	2690.0%	2540.0%	2540.0%	2660.0%	2670.0%	3000.0%	3010.0%
Output: Better than Envelope (%)	3100.0%	3230.0%	3100.0%	3230.0%	2530.0%	2660.0%	2530.0%	2660.0%	2530.0%	2590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7791	7808	7791	7808	7762	7779	7762	7779	7554	7568
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,098.57	$ 1,100.98	$ 1,098.57	$ 1,100.98	$ 1,094.4	$ 1,096.78	$ 1,094.4	$ 1,096.78	$ 1,065.18	$ 1,067.06
Annual savings in carbon tax for electricity [$/year]	$ 3.9	$ 3.9	$ 3.9	$ 3.9	$ 3.88	$ 3.89	$ 3.88	$ 3.89	$ 3.78	$ 3.78
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,102.47	$ 1,104.89	$ 1,102.47	$ 1,104.89	$ 1,098.28	$ 1,100.67	$ 1,098.28	$ 1,100.67	$ 1,068.96	$ 1,070.84
Annual savings in GHG from electricity savings [kg CO2e/year]	85.7	85.9	85.7	85.9	85.4	85.6	85.4	85.6	83.1	83.2
Annual savings in natural gas [m3/year]	8.35	8.35	7.43	7.43	8.4	8.4	7.48	7.48	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 77.36	$ 77.36	$ 68.87	$ 68.87	$ 77.81	$ 77.81	$ 69.28	$ 69.28	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ 19.31	$ 19.31	$ 17.19	$ 17.19	$ 19.42	$ 19.42	$ 17.29	$ 17.29	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 96.67	$ 96.67	$ 86.06	$ 86.06	$ 97.23	$ 97.23	$ 86.57	$ 86.57	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	429.1	429.1	382	382	431.6	431.6	384.3	384.3	0.2	0.2
Net Present Value [$]	$ 9,576.	$ 9,522.5	$ 9,482.01	$ 9,428.51	$ 9,407.94	$ 9,353.9	$ 9,314.92	$ 9,260.88	$ 8,992.73	$ 8,929.56
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99	$ 917.99	$ 917.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.

LANEWAY Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,517.75	$ 15,725.	$ 15,819.99	$ 15,822.5	$ 15,917.49	$ 15,962.63	$ 15,968.74	$ 15,976.39	$ 16,029.99	$ 16,060.13
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,472.99	$ 17,706.35	$ 17,813.31	$ 17,816.14	$ 17,923.09	$ 17,973.92	$ 17,980.8	$ 17,989.42	$ 18,049.77	$ 18,083.71
Net Present Value [$]	$ 1,812.62	$ 4,636.7	$ 4,764.83	$ 4,559.47	$ 4,704.58	$ 4,455.67	$ 4,411.95	$ 4,356.46	$ 4,582.58	$ 4,378.44
Incremental dollars per GHG saving	$ 19.57	$ 181.16	$ 180.18	$ 182.08	$ 181.09	$ 183.48	$ 183.76	$ 184.27	$ 182.37	$ 184.39
Auxiliary Energy Required Heating [GJ/yr]	7.8	7.9	7.4	7.7	7.3	7.8	7.8	7.8	7.1	7.7
Annual Energy DHW [Gj/yr]	7	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	7.8	3.8	3.6	3.8	3.5	3.8	3.8	3.8	3.5	3.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	42	47.5	47.2	47.5	47.1	47.4	47.5	47.5	47.1	47.4
Design Heating Load [W]	2822.7	3123.1	3003.7	3083.3	2963.9	3170.9	3088	3117.7	2973.7	3131.2
Annual Energy Electricity [kWh/yr]	11656.8	9234.2	9147.5	9226.3	9133	9212.2	9226.8	9245.4	9136.7	9204.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,586.12	$ 1,243.32	$ 1,231.06	$ 1,242.21	$ 1,229.	$ 1,240.21	$ 1,242.28	$ 1,244.91	$ 1,229.53	$ 1,239.09
Annual Energy Natural Gas [m3/yr]	0	382.7	382.7	382.7	382.7	382.7	382.7	382.7	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	13769	13292	12014	13508	12230	10736	13076	11798	12662	10952
Upgrade Package List	Pkg3300403054	Pkg3300401052	Pkg3300201053	Pkg3300402052	Pkg3300202053	Pkg3200301054	Pkg3300303052	Pkg3200403053	Pkg3300301053	Pkg3200302054
GHGI [kg/m2]	1.84	11.97	11.96	11.97	11.95	11.97	11.97	11.97	11.95	11.97
% ICC	7.8%	7.9%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.1%	8.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	98	98	98	98	98	98	98	98	98	98
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	31.1	31.4	29.5	30.8	28.9	31.3	31	31.1	28.2	30.7
Output: MEUI [kWh/(m2 * yr)]	65.1	85.7	84.5	85.6	84.3	85.4	85.6	85.8	84.3	85.3
Output: Better than ERS (%)	3570.0%	3190.0%	3230.0%	3190.0%	3240.0%	3200.0%	3190.0%	3190.0%	3240.0%	3200.0%
Output: Better than Envelope (%)	5060.0%	5000.0%	5320.0%	5130.0%	5380.0%	5060.0%	5060.0%	5060.0%	5510.0%	5130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5487	7909	7996	7917	8011	7931	7917	7898	8007	7939
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 773.64	$ 1,115.23	$ 1,127.45	$ 1,116.34	$ 1,129.49	$ 1,118.33	$ 1,116.27	$ 1,113.65	$ 1,128.97	$ 1,119.44
Annual savings in carbon tax for electricity [$/year]	$ 2.74	$ 3.95	$ 4.	$ 3.96	$ 4.01	$ 3.97	$ 3.96	$ 3.95	$ 4.	$ 3.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 776.38	$ 1,119.18	$ 1,131.45	$ 1,120.3	$ 1,133.5	$ 1,122.29	$ 1,120.23	$ 1,117.6	$ 1,132.98	$ 1,123.41
Annual savings in GHG from electricity savings [kg CO2e/year]	60.4	87	88	87.1	88.1	87.2	87.1	86.9	88.1	87.3
Annual savings in natural gas [m3/year]	14.26	0	0	0	0	0	0	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 132.08	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ 32.97	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 165.04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	732.6	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Net Present Value [$]	$ 1,812.62	$ 4,636.7	$ 4,764.83	$ 4,559.47	$ 4,704.58	$ 4,455.67	$ 4,411.95	$ 4,356.46	$ 4,582.58	$ 4,378.44
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	8.6	8.6	9.99	9.99	8.6	14.09	14.09	8.6	9.99
Attic Ceiling Code	CeilR80	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80	CeilR80	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 513.75	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 513.75	$ 513.75	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 873.78	$ 1,008.79	$ 873.78	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USi0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USi0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USi0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USi0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,517.75	$ 16,236.5	$ 16,217.75	$ 16,382.74	$ 16,517.75	$ 16,654.47	$ 16,935.72	$ 17,106.97	$ 17,204.47	$ 17,285.72
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,472.99	$ 18,282.3	$ 18,261.19	$ 18,446.97	$ 18,598.99	$ 18,752.93	$ 19,069.62	$ 19,262.45	$ 19,372.23	$ 19,463.72
Net Present Value [$]	$ 1,812.62	$ 1,057.36	$ 870.33	$ 875.51	$ 975.12	$ 132.03	$ 205.69	$ 70.92	$ 54.67	$ 54.67
Incremental dollars per GHG saving	$ 19.57	$ 20.48	$ 20.48	$ 20.67	$ 20.81	$ 21.1	$ 21.43	$ 21.61	$ 21.72	$ 21.81
Auxiliary Energy Required Heating [GJ/yr]	7.8	7.8	7.7	7.9	7.6	7.9	7.6	7.8	7.6	7.9
Annual Energy DHW [GJ/yr]	7	7	7.4	7	7	8	8	7.4	7.4	7
Annual Energy Space Heating [GJ/yr]	7.8	7.8	7.7	7.9	7.6	7.9	7.6	7.8	7.6	7.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	42	42	42.3	42.1	41.7	43.1	42.8	42.4	42.2	42.1
Design Heating Load [W]	2822.7	2786.5	2763.1	2791.2	2763.1	2645.5	2622.1	2685.2	2645.5	2660.1
Annual Energy Electricity [kWh/yr]	11656.8	11671	11750.9	11684.8	11593.7	11970.6	11890	11771.1	11726.9	11695.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,586.12	$ 1,588.13	$ 1,599.44	$ 1,590.08	$ 1,577.19	$ 1,630.52	$ 1,619.12	$ 1,602.3	$ 1,596.04	$ 1,591.58
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	13769	14795	14937	14651	14939	13603	13819	13389	13605	13805
Upgrade Package List	Pkg3300403054	Pkg4300402054	Pkg4300403054	Pkg4300303054	Pkg4300403054	Pkg3300402064	Pkg3300403064	Pkg3300401064	Pkg3300402064	Pkg3300403063
GHGI [kg/m2]	1.84	1.84	1.85	1.84	1.83	1.89	1.88	1.86	1.85	1.85
% ICC	7.8%	8.2%	8.2%	8.2%	8.3%	8.4%	8.5%	8.6%	8.7%	8.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	98	98	98	98	98	98	98	98	98	98
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	31.1	31.3	30.8	31.5	30.2	31.6	30.4	31.1	30.5	31.6
Output: MEUI [kWh/(m2 * yr)]	65.1	65.3	66.5	65.5	64.2	69.6	68.5	66.8	66.1	65.7
Output: Better than ERS (%)	3570.0%	3570.0%	3520.0%	3550.0%	3610.0%	3400.0%	3450.0%	3510.0%	3540.0%	3550.0%
Output: Better than Envelope (%)	5060.0%	5060.0%	5130.0%	5000.0%	5190.0%	5000.0%	5190.0%	5060.0%	5190.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5487	5473	5393	5459	5550	5173	5254	5372	5417	5448
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 773.64	$ 771.64	$ 760.37	$ 769.69	$ 782.54	$ 729.39	$ 740.76	$ 757.52	$ 763.75	$ 768.2
Annual savings in carbon tax for electricity [$/year]	$ 2.74	$ 2.74	$ 2.7	$ 2.73	$ 2.77	$ 2.59	$ 2.63	$ 2.69	$ 2.71	$ 2.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 776.38	$ 774.37	$ 763.07	$ 772.42	$ 785.31	$ 731.98	$ 743.38	$ 760.21	$ 766.46	$ 770.92
Annual savings in GHG from electricity savings [kg CO2e/year]	60.4	60.2	59.3	60	61	56.9	57.8	59.1	59.6	59.9
Annual savings in natural gas [m3/year]	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26	14.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08	$ 132.08
Annual savings in carbon tax for natural gas [$/year]	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97	$ 32.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04	$ 165.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6
Net Present Value [$]	$ 1,812.62	$ 1,057.36	$ 870.33	$ 875.51	$ 975.12	$ 132.03	$ 205.69	$ 70.92	$ 54.67	$ 54.67
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	9.99	14.09	14.09	14.09	9.99	14.09	8.6	9.99	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR50	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 135.	$ 232.5	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi0 80 SHGC0 25	USi0 80 SHGC0 25	USi0 80 SHGC0 25	USi0 80 SHGC0 25	USi0 80 SHGC0 25
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.	$ 550.	$ 850.

LANEWAY Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,819.99	$ 15,917.49	$ 15,725.	$ 16,029.99	$ 15,822.5	$ 16,127.49	$ 16,165.	$ 16,369.99	$ 16,198.74	$ 15,962.63
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,813.31	$ 17,923.09	$ 17,706.35	$ 18,049.77	$ 17,816.14	$ 18,159.55	$ 18,201.79	$ 18,432.61	$ 18,239.78	$ 17,973.92
Net Present Value [$]	$ 4,764.83	$ 4,704.58	$ 4,636.7	$ 4,582.58	$ 4,559.47	$ 4,508.63	$ 4,502.71	$ 4,483.37	$ 4,475.91	$ 4,455.67
Incremental dollars per GHG saving	$ 180.18	$ 181.09	$ 181.16	$ 182.37	$ 182.08	$ 183.27	$ 183.49	$ 109.43	$ 183.87	$ 183.48
Auxiliary Energy Required Heating [GJ/yr]	7.4	7.3	7.9	7.1	7.7	6.9	6.8	7.4	7	7.8
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	14.3	14.3	14.3	13	14.3	14.3
Annual Energy Space Heating [GJ/yr]	3.6	3.5	3.8	3.5	3.8	3.4	3.4	3.6	3.5	3.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	47.2	47.1	47.5	47.1	47.5	47.1	47.1	46	47.1	47.4
Design Heating Load [W]	3003.7	2963.9	3123.1	2973.7	3083.3	2934	2945.7	3003.7	2940.6	3170.9
Annual Energy Electricity [kWh/yr]	9147.5	9133	9234.2	9136.7	9226.3	9127.6	9115.3	9148.3	9112.6	9212.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,231.06	$ 1,229.	$ 1,243.32	$ 1,229.53	$ 1,242.21	$ 1,228.24	$ 1,226.5	$ 1,231.17	$ 1,226.12	$ 1,240.21
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	382.7	382.7	382.7	350.4	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	12014	12230	13292	12662	13508	12878	13310	12016	12446	10736
Upgrade Package List	Pkg3300201053	Pkg3300202053	Pkg3300401052	Pkg3300301053	Pkg3300402052	Pkg3300302053	Pkg3300401053	Pkg3300201053	Pkg3300203053	Pkg3200301054
GHGI [kg/m2]	11.96	11.95	11.97	11.95	11.97	11.95	11.95	11.07	11.95	11.97
% ICC	8.0%	8.0%	7.9%	8.1%	8.0%	8.1%	8.1%	8.2%	8.2%	8.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	98	98	98	98	98	98	98	98	98	98
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	29.5	28.9	31.4	28.2	30.8	27.6	27	29.5	27.9	31.3
Output: MEUI [kWh/(m2 * yr)]	84.5	84.3	85.7	84.3	85.6	84.2	84	79.7	84	85.4
Output: Better than ERS (%)	3230.0%	3240.0%	3190.0%	3240.0%	3190.0%	3240.0%	3240.0%	3400.0%	3240.0%	3200.0%
Output: Better than Envelope (%)	5320.0%	5380.0%	5000.0%	5510.0%	5130.0%	5630.0%	5700.0%	5320.0%	5570.0%	5060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7996	8011	7909	8007	7917	8016	8028	7995	8031	7931
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,127.45	$ 1,129.49	$ 1,115.23	$ 1,128.97	$ 1,116.34	$ 1,130.26	$ 1,131.99	$ 1,127.34	$ 1,132.37	$ 1,118.33
Annual savings in carbon tax for electricity [$/year]	$ 4.	$ 4.01	$ 3.95	$ 4.	$ 3.96	$ 4.01	$ 4.01	$ 4.	$ 4.02	$ 3.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,131.45	$ 1,133.5	$ 1,119.18	$ 1,132.98	$ 1,120.3	$ 1,134.26	$ 1,136.	$ 1,131.33	$ 1,136.39	$ 1,122.29
Annual savings in GHG from electricity savings [kg CO2e/year]	88	88.1	87	88.1	87.1	88.2	88.3	87.9	88.3	87.2
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	0	1.2	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ 11.12	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ 2.77	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 13.89	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	61.7	0.2	0.2
Net Present Value [$]	$ 4,764.83	$ 4,704.58	$ 4,636.7	$ 4,582.58	$ 4,559.47	$ 4,508.63	$ 4,502.71	$ 4,483.37	$ 4,475.91	$ 4,455.67
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	9.99	9.99	8.6	8.6	14.09	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 513.75	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 663.78	$ 663.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 663.78	$ 663.78	$ 873.78
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

LANEWAY Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 5,504.09	$ 5,505.13	$ 5,555.13	$ 5,601.59	$ 5,602.63	$ 5,652.63	$ 5,683.63	$ 5,755.13	$ 5,852.63	$ 5,855.13
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 8,267.14	$ 8,268.71	$ 8,343.81	$ 8,413.59	$ 8,415.15	$ 8,490.25	$ 8,536.81	$ 8,644.21	$ 8,790.65	$ 8,794.41
Net Present Value [$]	$ 13,154.32	$ 14,935.08	$ 13,987.03	$ 13,222.6	$ 14,999.72	$ 14,052.94	$ 14,006.89	$ 14,491.12	$ 14,549.37	$ 13,895.14
Incremental dollars per GHG saving	$ 27.42	$ 63.21	$ 35.56	$ 27.81	$ 63.81	$ 36.03	$ 67.74	$ 999,999.	$ 999,999.	$ 28.51
Auxiliary Energy Required Heating [GJ/yr]	23.4	20.1	21.8	23.2	19.9	21.6	21.2	18.1	17.9	21.9
Annual Energy DHW [GJ/yr]	13.4	15.8	14.3	13.4	15.8	14.3	15.8	23	23	13.4
Annual Energy Space Heating [GJ/yr]	23.4	20.1	21.8	23.2	19.9	21.6	21.2	18.1	17.9	21.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	63	62.2	62.4	62.8	61.9	62.2	63.2	67.4	67.2	61.5
Design Heating Load [W]	5898.5	5492.3	5835.7	5851.3	5445.1	5788.5	5445.1	5779.9	5732.7	5835.7
Annual Energy Electricity [kWh/yr]	13781.5	12879.6	13354.6	13717.1	12816.6	13291.1	13170.8	12323.3	12262.8	13357.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,886.77	$ 1,759.15	$ 1,826.36	$ 1,877.65	$ 1,750.23	$ 1,817.38	$ 1,800.35	$ 1,680.43	$ 1,671.87	$ 1,826.76
Annual Energy Natural Gas [m3/yr]	359.4	423.9	385.1	359.4	423.9	385.1	423.9	618	618	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 155.03	$ 182.86	$ 166.12	$ 155.03	$ 182.86	$ 166.12	$ 182.86	$ 266.58	$ 266.58	$ 155.03
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	18335	19951	16713	18605	20221	16983	20167	19949	20219	16715
Upgrade Package List	Pkg2100101031	Pkg2200101031	Pkg1200101031	Pkg2100102031	Pkg2200102031	Pkg1200102031	Pkg2200102021	Pkg2200101031	Pkg2200102031	Pkg1200101031
GHGI [kg/m2]	12.05	13.68	12.69	12.04	13.67	12.68	13.72	18.92	18.91	11.98
% ICC	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	145	145	145	145	145	145	145	145	145	145
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	93.2	80.2	87.1	92.3	79.3	86.2	84.4	72.3	71.4	87.1
Output: MEUI [kWh/(m2 * yr)]	149	145.6	146.6	148	144.7	145.7	149.8	166.4	165.5	142.9
Output: Better than ERS (%)	2030.0%	2130.0%	2100.0%	2050.0%	2160.0%	2130.0%	2000.0%	2040.0%	2070.0%	2220.0%
Output: Better than Envelope (%)	1300.0%	2530.0%	1900.0%	1380.0%	2600.0%	1970.0%	2120.0%	3270.0%	3350.0%	1860.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7038	7940	7465	7102	8003	7528	7649	8496	8557	7462
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 992.36	$ 1,119.53	$ 1,052.55	$ 1,001.44	$ 1,128.41	$ 1,061.5	$ 1,078.47	$ 1,197.96	$ 1,206.49	$ 1,052.16
Annual savings in carbon tax for electricity [$/year]	$ 3.52	$ 3.97	$ 3.73	$ 3.55	$ 4.	$ 3.76	$ 3.82	$ 4.25	$ 4.28	$ 3.73
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 995.88	$ 1,123.5	$ 1,056.28	$ 1,004.99	$ 1,132.41	$ 1,065.27	$ 1,082.29	$ 1,202.21	$ 1,210.77	$ 1,055.89
Annual savings in GHG from electricity savings [kg CO2e/year]	77.4	87.3	82.1	78.1	88	82.8	84.1	93.5	94.1	82.1
Annual savings in natural gas [m3/year]	2.4	0	1.44	2.4	0	1.44	0	7.24	7.24	2.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 22.23	$ .03	$ 13.36	$ 22.23	$ .03	$ 13.36	$ .03	$ 67.04	$ 67.04	$ 22.23
Annual savings in carbon tax for natural gas [$/year]	$ 5.55	$ .01	$ 3.33	$ 5.55	$ .01	$ 3.33	$ .01	$ 16.73	$ 16.73	$ 5.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 27.78	$ .04	$ 16.69	$ 27.78	$ .04	$ 16.69	$ .04	$ 83.77	$ 83.77	$ 27.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	123.3	0.2	74.1	123.3	0.2	74.1	0.2	371.8	371.8	123.3
Net Present Value [$]	$ 13,154.32	$ 14,935.08	$ 13,987.03	$ 13,222.6	$ 14,999.72	$ 14,052.94	$ 14,006.89	$ 14,491.12	$ 14,549.37	$ 13,895.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	8.6	8.6	9.99	9.99	9.99	9.99	8.6	9.99	8.6
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	3.87	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$ 850.	$ 850.

LANEWAY Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,376.63	$ 6,829.13	$ 6,926.63	$ 7,129.13	$ 7,152.91	$ 7,226.63	$ 7,250.41	$ 7,590.41	$ 7,702.91	$ 7,792.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,577.7	$ 10,257.35	$ 10,403.8	$ 10,707.95	$ 10,743.67	$ 10,854.4	$ 10,890.12	$ 11,400.8	$ 11,569.77	$ 11,704.95
Net Present Value [$]	$ 8,549.06	$ 8,760.98	$ 8,832.37	$ 9,011.29	$ 7,748.86	$ 9,082.32	$ 7,820.43	$ 7,866.78	$ 8,029.62	$ 8,046.43
Incremental dollars per GHG saving	$ 7.42	$ 7.92	$ 8.02	$ 8.24	$ 8.32	$ 8.35	$ 8.43	$ 8.8	$ 8.92	$ 9.02
Auxiliary Energy Required Heating [GJ/yr]	24	23.8	23.6	23.5	24.1	23.3	23.8	24	23.6	24
Annual Energy DHW [GJ/yr]	8.8	8.1	8.1	7.6	8.8	7.6	8.8	8.1	8.1	7.6
Annual Energy Space Heating [GJ/yr]	24	23.8	23.6	23.5	24.1	23.3	23.8	24	23.6	24
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	59	58.1	57.9	57.3	59.1	57.1	58.8	58.3	57.9	57.8
Design Heating Load [W]	5445.1	5492.3	5445.1	5492.3	5484.1	5445.1	5436.9	5473.8	5484.1	5521
Annual Energy Electricity [kWh/yr]	16400.8	16142.7	16077.1	15928.9	16410.1	15863.5	16344.4	16194.3	16087.4	16045.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,257.4	$ 2,220.88	$ 2,211.59	$ 2,190.62	$ 2,258.71	$ 2,181.37	$ 2,249.42	$ 2,228.18	$ 2,213.05	$ 2,207.18
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	20227	19959	20229	19961	21469	20231	21847	20877	21471	20501
Upgrade Package List	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200301031	Pkg2200102031	Pkg2200302031	Pkg2200202031	Pkg2200301031	Pkg2200201031
GHGI [kg/m2]	2.59	2.55	2.54	2.51	2.59	2.5	2.58	2.56	2.54	2.53
% ICC	3.2%	3.4%	3.5%	3.6%	3.6%	3.6%	3.6%	3.8%	3.9%	3.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	145	145	145	145	145	145	145	145	145	145
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	95.8	95	94	93.8	95.9	92.9	95	95.7	94.2	95.5
Output: MEUI [kWh/(m2 * yr)]	133.2	129.5	128.5	126.4	133.3	125.5	132.4	130.2	128.7	128.1
Output: Better than ERS (%)	2410.0%	2520.0%	2550.0%	2630.0%	2390.0%	2650.0%	2430.0%	2500.0%	2550.0%	2560.0%
Output: Better than Envelope (%)	1080.0%	1150.0%	1230.0%	1260.0%	1040.0%	1340.0%	1150.0%	1080.0%	1230.0%	1080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4419	4677	4742	4891	4409	4956	4475	4625	4732	4774
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 623.04	$ 659.43	$ 668.68	$ 689.57	$ 621.73	$ 698.8	$ 630.99	$ 652.15	$ 667.23	$ 673.08
Annual savings in carbon tax for electricity [$/year]	$ 2.21	$ 2.34	$ 2.37	$ 2.45	$ 2.2	$ 2.48	$ 2.24	$ 2.31	$ 2.37	$ 2.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 625.25	$ 661.77	$ 671.05	$ 692.02	$ 623.93	$ 701.27	$ 633.23	$ 654.47	$ 669.59	$ 675.46
Annual savings in GHG from electricity savings [kg CO2e/year]	48.6	51.4	52.2	53.8	48.5	54.5	49.2	50.9	52.1	52.5
Annual savings in natural gas [m3/year]	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3
Annual savings in carbon tax for natural gas [$/year]	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4
Net Present Value [$]	$ 8,549.06	$ 8,760.98	$ 8,832.37	$ 9,011.29	$ 7,748.86	$ 9,082.32	$ 7,820.43	$ 7,866.78	$ 8,029.62	$ 8,046.43
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	8.6	9.99	9.99	9.99	8.6	8.6
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 232.5	$ 135.	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	BC EffR14	NA	BC EffR14	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$ 873.78	$.	$ 873.78	$ 663.78	$ 873.78	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$.	$ 550.	$ 550.	$ 850.

LANEWAY Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,155.13	$ 8,252.63	$ 7,804.09	$ 7,901.59	$ 8,705.13	$ 8,802.63	$ 8,354.09	$ 9,005.13	$ 8,451.59	$ 9,102.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,249.01	$ 12,395.45	$ 11,721.74	$ 11,868.19	$ 13,075.11	$ 13,221.55	$ 12,547.84	$ 13,525.71	$ 12,694.29	$ 13,672.15
Net Present Value [$]	$ 17,401.29	$ 17,373.91	$ 17,349.37	$ 17,294.05	$ 17,172.	$ 17,144.43	$ 17,119.89	$ 17,084.3	$ 17,064.93	$ 17,056.92
Incremental dollars per GHG saving	$ 74.82	$ 75.5	$ 72.73	$ 73.5	$ 47.49	$ 47.95	$ 46.	$ 38.73	$ 46.51	$ 39.1
Auxiliary Energy Required Heating [GJ/yr]	21.8	21.6	23.4	23.1	21.8	21.6	23.4	21.9	23.1	21.6
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	14.3	14.3	13.4	14.3	13.4
Annual Energy Space Heating [GJ/yr]	12.1	12	12.6	12.6	12.1	12	12.6	12.1	12.6	12
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	55	54.9	55.6	55.5	53.6	53.5	54.1	52.6	54.1	52.5
Design Heating Load [W]	5901.1	5854	5945.6	5898.4	5901.1	5854	5945.6	5901.1	5898.4	5854
Annual Energy Electricity [kWh/yr]	10892.3	10865	11048.8	11032.4	10893.9	10866.7	11050.5	10895	11034	10867.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,477.95	$ 1,474.08	$ 1,500.09	$ 1,497.77	$ 1,478.17	$ 1,474.32	$ 1,500.33	$ 1,478.33	$ 1,498.	$ 1,474.48
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	385.1	385.1	359.4	385.1	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 166.12	$ 155.03	$ 166.12	$ 155.03
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	16712	16982	18332	18602	16714	16984	18334	16716	18604	16986
Upgrade Package List	Pkg1200101031	Pkg1200102031	Pkg2100101031	Pkg2100102031	Pkg1200101031	Pkg1200102031	Pkg2100101031	Pkg1200101031	Pkg2100102031	Pkg1200102031
GHGI [kg/m2]	13.36	13.36	13.39	13.39	12.3	12.29	12.32	11.59	12.32	11.59
% ICC	4.1%	4.2%	3.9%	4.0%	4.4%	4.4%	4.2%	4.5%	4.3%	4.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	145	145	145	145	145	145	145	145	145	145
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	87	86.1	93.1	92.2	87.1	86.2	93.1	87.1	92.2	86.2
Output: MEUI [kWh/(m2 * yr)]	116.5	116.1	118.7	118.5	110.8	110.4	113	107	112.8	106.6
Output: Better than ERS (%)	3230.0%	3240.0%	3150.0%	3170.0%	3400.0%	3410.0%	3340.0%	3520.0%	3340.0%	3530.0%
Output: Better than Envelope (%)	1900.0%	1970.0%	1300.0%	1410.0%	1900.0%	1970.0%	1300.0%	1860.0%	1410.0%	1970.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9927	9954	9771	9787	9926	9953	9769	9924	9786	9952
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,399.74	$ 1,403.58	$ 1,377.67	$ 1,379.98	$ 1,399.51	$ 1,403.34	$ 1,377.43	$ 1,399.35	$ 1,379.76	$ 1,403.19
Annual savings in carbon tax for electricity [$/year]	$ 4.96	$ 4.98	$ 4.89	$ 4.89	$ 4.96	$ 4.98	$ 4.88	$ 4.96	$ 4.89	$ 4.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,404.7	$ 1,408.56	$ 1,382.55	$ 1,384.87	$ 1,404.47	$ 1,408.32	$ 1,382.31	$ 1,404.32	$ 1,384.65	$ 1,408.17
Annual savings in GHG from electricity savings [kg CO2e/year]	109.2	109.5	107.5	107.7	109.2	109.5	107.5	109.2	107.6	109.5
Annual savings in natural gas [m3/year]	0	0	0	0	1.44	1.44	1.44	2.4	1.44	2.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ 13.36	$ 13.36	$ 13.36	$ 22.23	$ 13.36	$ 22.23
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ 3.33	$ 3.33	$ 3.33	$ 5.55	$ 3.33	$ 5.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ 16.69	$ 16.69	$ 16.69	$ 27.78	$ 16.69	$ 27.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	74.1	74.1	74.1	123.3	74.1	123.3
Net Present Value [$]	$ 17,401.29	$ 17,373.91	$ 17,349.37	$ 17,294.05	$ 17,172.	$ 17,144.43	$ 17,119.89	$ 17,084.3	$ 17,064.93	$ 17,056.92
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	3.87	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.

LANEWAY Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,655.13	$ 8,736.13	$ 8,752.63	$ 8,833.63	$ 9,205.13	$ 9,286.13	$ 9,302.63	$ 9,318.91	$ 9,383.63	$ 9,416.41
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,000.01	$ 13,121.67	$ 13,146.45	$ 13,268.11	$ 13,826.11	$ 13,947.77	$ 13,972.55	$ 13,997.	$ 14,094.21	$ 14,143.45
Net Present Value [$]	$ 17,543.45	$ 17,180.9	$ 17,534.87	$ 17,173.05	$ 17,314.15	$ 16,951.42	$ 17,305.57	$ 16,771.03	$ 16,943.57	$ 16,717.9
Incremental dollars per GHG saving	$ 77.49	$ 79.06	$ 78.08	$ 79.65	$ 49.49	$ 50.25	$ 49.91	$ 83.73	$ 50.67	$ 84.45
Auxiliary Energy Required Heating [GJ/yr]	20.1	21.4	19.9	21.2	20.2	21.4	19.9	20.5	21.2	20.3
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	14.3	14.3	15.8	14.3	15.8
Annual Energy Space Heating [GJ/yr]	11.2	11.6	11	11.4	11.2	11.6	11	11.3	11.5	11.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	54.1	54.5	54	54.4	52.7	53.1	52.5	54.3	52.9	54.2
Design Heating Load [W]	5539.4	5539.4	5492.2	5492.2	5539.4	5539.4	5492.2	5568.1	5492.2	5520.9
Annual Energy Electricity [kWh/yr]	10642.8	10752.2	10608.3	10717.4	10644.5	10753.9	10609.9	10685	10719.1	10667.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,442.64	$ 1,458.12	$ 1,437.76	$ 1,453.2	$ 1,442.88	$ 1,458.36	$ 1,437.99	$ 1,448.61	$ 1,453.44	$ 1,446.18
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	385.1	385.1	423.9	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 166.12	$ 182.86	$ 166.12	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	19952	19898	20222	20168	19954	19900	20224	20492	20170	20870
Upgrade Package List	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200102021	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200201031	Pkg2200102021	Pkg2200202031
GHGI [kg/m2]	13.32	13.34	13.32	13.34	12.26	12.28	12.25	13.33	12.27	13.33
% ICC	4.4%	4.4%	4.4%	4.4%	4.6%	4.7%	4.7%	4.7%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	110	110	110	110	110	110	110	110	110	110
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	80.2	85.4	79.3	84.4	80.3	85.4	79.4	81.9	84.5	80.9
Output: MEUI [kWh/(m2 * yr)]	112.9	114.7	112.4	114.2	107.2	109	106.7	113.5	108.5	113.3
Output: Better than ERS (%)	3340.0%	3290.0%	3350.0%	3300.0%	3510.0%	3460.0%	3530.0%	3310.0%	3490.0%	3330.0%
Output: Better than Envelope (%)	2530.0%	2040.0%	2600.0%	2120.0%	2490.0%	2040.0%	2600.0%	2380.0%	2120.0%	2450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10177	10067	10211	10102	10175	10066	10210	10134	10100	10152
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,434.91	$ 1,419.49	$ 1,439.78	$ 1,424.4	$ 1,434.68	$ 1,419.25	$ 1,439.55	$ 1,428.96	$ 1,424.16	$ 1,431.39
Annual savings in carbon tax for electricity [$/year]	$ 5.09	$ 5.03	$ 5.11	$ 5.05	$ 5.09	$ 5.03	$ 5.1	$ 5.07	$ 5.05	$ 5.08
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,440.	$ 1,424.52	$ 1,444.88	$ 1,429.45	$ 1,439.76	$ 1,424.28	$ 1,444.66	$ 1,434.03	$ 1,429.21	$ 1,436.47
Annual savings in GHG from electricity savings [kg CO2e/year]	111.9	110.7	112.3	111.1	111.9	110.7	112.3	111.5	111.1	111.7
Annual savings in natural gas [m3/year]	0	0	0	0	1.44	1.44	1.44	0	1.44	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ 13.36	$ 13.36	$ 13.36	$ .03	$ 13.36	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ 3.33	$ 3.33	$ 3.33	$ .01	$ 3.33	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ 16.69	$ 16.69	$ 16.69	$ .04	$ 16.69	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	74.1	74.1	74.1	0.2	74.1	0.2
Net Present Value [$]	$ 17,543.45	$ 17,180.9	$ 17,534.87	$ 17,173.05	$ 17,314.15	$ 16,951.42	$ 17,305.57	$ 16,771.03	$ 16,943.57	$ 16,717.9
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	8.6	9.99	9.99	8.6	8.6	9.99	8.6	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$.	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$.	$ 550.	$.

LANEWAY Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 10,860.35	$ 11,005.28	$ 11,005.28	$ 11,084.03	$ 11,102.78	$ 11,102.78	$ 11,205.28	$ 11,249.02	$ 11,249.02	$ 11,257.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,312.25	$ 16,529.93	$ 16,529.93	$ 16,648.21	$ 16,676.38	$ 16,676.38	$ 16,830.33	$ 16,896.03	$ 16,896.03	$ 16,909.17
Net Present Value [$]	$ 8,318.84	$ 8,221.01	$ 8,105.07	$ 8,067.59	$ 8,284.55	$ 8,169.89	$ 7,995.27	$ 8,047.93	$ 7,930.17	$ 7,842.91
Incremental dollars per GHG saving	$ 12.37	$ 12.53	$ 12.54	$ 12.62	$ 12.63	$ 12.64	$ 12.76	$ 12.8	$ 12.81	$ 12.83
Auxiliary Energy Required Heating [GJ/yr]	19.3	18.3	18.5	17.9	18.1	18.2	17.8	18.2	18.4	18.5
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	8.1	7.6	7.6	8.1	7.6	7.6	7.6
Annual Energy Space Heating [GJ/yr]	19.3	18.3	18.5	17.9	18.1	18.2	17.8	18.2	18.4	18.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	53.1	53	53.2	53.1	52.8	53	53.1	52.9	53.1	53.2
Design Heating Load [W]	4968.6	4086.5	3984.2	4011.5	4039.3	3937	3939	4046.4	3944.1	3963.7
Annual Energy Electricity [kWh/yr]	14748.6	14730.3	14775.3	14759.3	14667.7	14712.3	14740.3	14702.8	14748.6	14779.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,023.61	$ 2,021.02	$ 2,027.39	$ 2,025.13	$ 2,012.16	$ 2,018.48	$ 2,022.44	$ 2,017.13	$ 2,023.61	$ 2,027.93
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	20339	24317	28187	24747	24533	28403	28203	24101	27971	27125
Upgrade Package List	Pkg2200102051	Pkg2300401034	Pkg3300401033	Pkg2300403034	Pkg2300402034	Pkg3300402033	Pkg3300401034	Pkg2300303034	Pkg3300303033	Pkg3300202034
GHGI [kg/m2]	2.33	2.32	2.33	2.33	2.31	2.32	2.32	2.33	2.33	2.33
% ICC	5.5%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.7%	5.7%	5.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	110	110	110	110	110	110	110	110	110	110
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	76.9	72.9	73.6	71.4	72	72.7	71.1	72.5	73.2	73.6
Output: MEUI [kWh/(m2 * yr)]	109.5	109.2	109.9	109.6	108.3	109	109.4	108.8	109.5	109.9
Output: Better than ERS (%)	3170.0%	3180.0%	3150.0%	3170.0%	3200.0%	3180.0%	3170.0%	3190.0%	3170.0%	3150.0%
Output: Better than Envelope (%)	2830.0%	3200.0%	3120.0%	3350.0%	3270.0%	3230.0%	3380.0%	3230.0%	3160.0%	3120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6071	6089	6044	6060	6152	6107	6079	6117	6071	6040
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 856.	$ 858.58	$ 852.23	$ 854.49	$ 867.4	$ 861.12	$ 857.17	$ 862.45	$ 856.	$ 851.7
Annual savings in carbon tax for electricity [$/year]	$ 3.04	$ 3.04	$ 3.02	$ 3.03	$ 3.08	$ 3.05	$ 3.04	$ 3.06	$ 3.04	$ 3.02
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 859.03	$ 861.62	$ 855.25	$ 857.52	$ 870.48	$ 864.17	$ 860.21	$ 865.51	$ 859.03	$ 854.72
Annual savings in GHG from electricity savings [kg CO2e/year]	66.8	67	66.5	66.7	67.7	67.2	66.9	67.3	66.8	66.4
Annual savings in natural gas [m3/year]	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3
Annual savings in carbon tax for natural gas [$/year]	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4
Net Present Value [$]	$ 8,318.84	$ 8,221.01	$ 8,105.07	$ 8,067.59	$ 8,284.55	$ 8,169.89	$ 7,995.27	$ 8,047.93	$ 7,930.17	$ 7,842.91
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	8.6	14.09	9.99	9.99	8.6	14.09	14.09	9.99
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60	CeilR50	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 135.	$ 513.75	$ 232.5	$ 232.5	$ 135.	$ 513.75	$ 513.75	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 873.78	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.

LANEWAY Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,655.13	$ 8,752.63	$ 9,205.13	$ 9,302.63	$ 9,505.13	$ 9,602.63	$ 8,736.13	$ 8,833.63	$ 9,286.13	$ 9,383.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,000.01	$ 13,146.45	$ 13,826.11	$ 13,972.55	$ 14,276.71	$ 14,423.15	$ 13,121.67	$ 13,268.11	$ 13,947.77	$ 14,094.21
Net Present Value [$]	$ 17,543.45	$ 17,534.87	$ 17,314.15	$ 17,305.57	$ 17,226.46	$ 17,218.06	$ 17,180.9	$ 17,173.05	$ 16,951.42	$ 16,943.57
Incremental dollars per GHG saving	$ 77.49	$ 78.08	$ 49.49	$ 49.91	$ 40.41	$ 40.76	$ 79.06	$ 79.65	$ 50.25	$ 50.67
Auxiliary Energy Required Heating [GJ/yr]	20.1	19.9	20.2	19.9	20.2	19.9	21.4	21.2	21.4	21.2
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	14.3	13.4	13.4	15.8	15.8	14.3	14.3
Annual Energy Space Heating [GJ/yr]	11.2	11	11.2	11	11.2	11	11.6	11.4	11.6	11.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	54.1	54	52.7	52.5	51.7	51.6	54.5	54.4	53.1	52.9
Design Heating Load [W]	5539.4	5492.2	5539.4	5492.2	5539.4	5492.2	5539.4	5492.2	5539.4	5492.2
Annual Energy Electricity [kWh/yr]	10642.8	10608.3	10644.5	10609.9	10645.6	10611	10752.2	10717.4	10753.9	10719.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,442.64	$ 1,437.76	$ 1,442.88	$ 1,437.99	$ 1,443.04	$ 1,438.14	$ 1,458.12	$ 1,453.2	$ 1,458.36	$ 1,453.44
Annual Energy Natural Gas [m3/yr]	423.9	423.9	385.1	385.1	359.4	359.4	423.9	423.9	385.1	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 155.03	$ 155.03	$ 182.86	$ 182.86	$ 166.12	$ 166.12
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	19952	20222	19954	20224	19956	20226	19898	20168	19900	20170
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101021	Pkg2200102021	Pkg2200101021	Pkg2200102021
GHGI [kg/m2]	13.32	13.32	12.26	12.25	11.55	11.55	13.34	13.34	12.28	12.27
% ICC	4.4%	4.4%	4.6%	4.7%	4.8%	4.8%	4.4%	4.4%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	110	110	110	110	110	110	110	110	110	110
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	80.2	79.3	80.3	79.4	80.3	79.4	85.4	84.4	85.4	84.5
Output: MEUI [kWh/(m2 * yr)]	112.9	112.4	107.2	106.7	103.4	102.9	114.7	114.2	109	108.5
Output: Better than ERS (%)	3340.0%	3350.0%	3510.0%	3530.0%	3630.0%	3650.0%	3290.0%	3300.0%	3460.0%	3490.0%
Output: Better than Envelope (%)	2530.0%	2600.0%	2490.0%	2600.0%	2490.0%	2600.0%	2040.0%	2120.0%	2040.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10177	10211	10175	10210	10174	10208	10067	10102	10066	10100
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,434.91	$ 1,439.78	$ 1,434.68	$ 1,439.55	$ 1,434.52	$ 1,439.4	$ 1,419.49	$ 1,424.4	$ 1,419.25	$ 1,424.16
Annual savings in carbon tax for electricity [$/year]	$ 5.09	$ 5.11	$ 5.09	$ 5.1	$ 5.09	$ 5.1	$ 5.03	$ 5.05	$ 5.03	$ 5.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,440.	$ 1,444.88	$ 1,439.76	$ 1,444.66	$ 1,439.61	$ 1,444.5	$ 1,424.52	$ 1,429.45	$ 1,424.28	$ 1,429.21
Annual savings in GHG from electricity savings [kg CO2e/year]	111.9	112.3	111.9	112.3	111.9	112.3	110.7	111.1	110.7	111.1
Annual savings in natural gas [m3/year]	0	0	1.44	1.44	2.4	2.4	0	0	1.44	1.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ 13.36	$ 13.36	$ 22.23	$ 22.23	$ .03	$ .03	$ 13.36	$ 13.36
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ 3.33	$ 3.33	$ 5.55	$ 5.55	$ .01	$ .01	$ 3.33	$ 3.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ 16.69	$ 16.69	$ 27.78	$ 27.78	$ .04	$ .04	$ 16.69	$ 16.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	74.1	74.1	123.3	123.3	0.2	0.2	74.1	74.1
Net Present Value [$]	$ 17,543.45	$ 17,534.87	$ 17,314.15	$ 17,305.57	$ 17,226.46	$ 17,218.06	$ 17,180.9	$ 17,173.05	$ 16,951.42	$ 16,943.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99	$ 917.99	$ 917.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.	$ 550.

LANEWAY Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,725.	$ 15,819.99	$ 15,822.5	$ 15,917.49	$ 15,968.74	$ 15,976.39	$ 16,029.99	$ 16,060.13	$ 16,097.64	$ 16,103.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,618.95	$ 23,761.62	$ 23,765.4	$ 23,908.07	$ 23,985.05	$ 23,996.54	$ 24,077.04	$ 24,122.32	$ 24,178.66	$ 24,187.83
Net Present Value [$]	$ 12,117.02	$ 12,275.1	$ 12,072.29	$ 12,223.61	$ 11,892.82	$ 11,822.54	$ 12,171.91	$ 11,732.41	$ 11,760.82	$ 11,881.6
Incremental dollars per GHG saving	$ 132.37	$ 132.05	$ 132.96	$ 132.65	$ 134.42	$ 134.71	$ 133.25	$ 135.41	$ 135.5	$ 134.87
Auxiliary Energy Required Heating [GJ/yr]	13.3	12.8	13.1	12.6	13.2	13.2	12.3	13.3	13.1	12.7
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Annual Energy Space Heating [GJ/yr]	7.9	7.6	7.8	7.5	7.8	7.9	7.4	8	7.9	7.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	51.8	51.4	51.7	51.4	51.8	51.9	51.3	51.9	51.8	51.6
Design Heating Load [W]	3749.7	3610.9	3702.5	3563.7	3709.7	3743.4	3573.9	3760.9	3773.2	3674.8
Annual Energy Electricity [kWh/yr]	10004.5	9906.2	9984	9888.3	9996.9	10021.2	9864.7	10023.7	9998.1	9948.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,352.32	$ 1,338.41	$ 1,349.42	$ 1,335.88	$ 1,351.25	$ 1,354.68	$ 1,332.54	$ 1,355.04	$ 1,351.42	$ 1,344.44
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	423.9	423.9	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	28268	26990	28484	27206	28052	26774	27638	25928	26360	28700
Upgrade Package List	Pkg3300401052	Pkg3300201053	Pkg3300402052	Pkg3300202053	Pkg3300303052	Pkg3200403053	Pkg3300301053	Pkg3200302054	Pkg3200401054	Pkg3300403052
GHGI [kg/m2]	13.22	13.21	13.22	13.21	13.22	13.23	13.2	13.23	13.22	13.21
% ICC	7.9%	8.0%	8.0%	8.0%	8.0%	8.0%	8.1%	8.1%	8.1%	8.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	113	113	113	113	113	113	113	113	113	113
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	53.1	51	52.3	50.2	52.7	52.8	49.1	53.1	52.1	50.8
Output: MEUI [kWh/(m2 * yr)]	103.7	102.4	103.4	102.1	103.6	104	101.7	104	103.6	102.9
Output: Better than ERS (%)	3620.0%	3670.0%	3630.0%	3670.0%	3620.0%	3610.0%	3680.0%	3610.0%	3620.0%	3650.0%
Output: Better than Envelope (%)	5060.0%	5240.0%	5130.0%	5320.0%	5090.0%	5090.0%	5430.0%	5060.0%	5130.0%	5280.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10815	10913	10836	10931	10823	10798	10955	10796	10821	10871
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,524.92	$ 1,538.78	$ 1,527.81	$ 1,541.3	$ 1,525.99	$ 1,522.56	$ 1,544.63	$ 1,522.21	$ 1,525.82	$ 1,532.77
Annual savings in carbon tax for electricity [$/year]	$ 5.41	$ 5.46	$ 5.42	$ 5.47	$ 5.41	$ 5.4	$ 5.48	$ 5.4	$ 5.41	$ 5.44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,530.32	$ 1,544.23	$ 1,533.22	$ 1,546.76	$ 1,531.4	$ 1,527.96	$ 1,550.1	$ 1,527.61	$ 1,531.23	$ 1,538.2
Annual savings in GHG from electricity savings [kg CO2e/year]	119	120	119.2	120.2	119	118.8	120.5	118.8	119	119.6
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	0	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Net Present Value [$]	$ 12,117.02	$ 12,275.1	$ 12,072.29	$ 12,223.61	$ 11,892.82	$ 11,822.54	$ 12,171.91	$ 11,732.41	$ 11,760.82	$ 11,881.6
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	8.6	9.99	9.99	14.09	14.09	8.6	9.99	8.6	14.09
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR80	CeilR80	CeilR50	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 513.75	$ 513.75	$ 135.	$ 232.5	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 2,683.14	$ 2,683.14	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 1,008.79	$ 873.78	$ 873.78	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 18,667.75	$ 18,817.75	$ 18,785.72	$ 19,386.5	$ 19,367.75	$ 19,532.74	$ 19,667.75	$ 19,804.47	$ 20,085.72	$ 20,256.97
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 28,038.96	$ 28,264.26	$ 28,216.15	$ 29,118.52	$ 29,090.36	$ 29,338.18	$ 29,540.96	$ 29,746.31	$ 30,168.75	$ 30,425.97
Net Present Value [$]	$ 7,453.68	$ 6,456.67	$ 4,945.31	$ 6,798.29	$ 6,509.57	$ 6,630.69	$ 6,604.68	$ 5,609.45	$ 5,439.39	$ 5,653.58
Incremental dollars per GHG saving	$ 20.56	$ 20.81	$ 20.93	$ 21.35	$ 21.36	$ 21.51	$ 21.65	$ 21.89	$ 22.19	$ 22.34
Auxiliary Energy Required Heating [GJ/yr]	13.3	13.4	12	13.2	13.1	13.3	12.8	13.4	13	13.3
Annual Energy DHW [GJ/yr]	7.6	8.8	7.6	7.6	8.1	7.6	7.6	8.8	8.8	8.1
Annual Energy Space Heating [GJ/yr]	7.8	7.8	12	7.7	7.6	7.7	7.5	7.6	7.4	7.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	43.4	44.6	46.7	43.3	43.7	43.3	43.2	44.4	44.2	43.7
Design Heating Load [W]	3419	3310.8	3056.9	3338.5	3310.8	3345.7	3310.8	3208.4	3180.7	3255.6
Annual Energy Electricity [kWh/yr]	12052	12381	12980.5	12027.4	12146.8	12035.7	11993.3	12326.8	12283.6	12133.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,642.04	$ 1,688.6	$ 1,773.43	$ 1,638.56	$ 1,655.46	$ 1,639.74	$ 1,633.74	$ 1,680.93	$ 1,674.81	$ 1,653.63
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	28746	29912	29951	29772	29914	29628	29916	28580	28796	28366
Upgrade Package List	Pkg3300403054	Pkg4300403054	Pkg4300403064	Pkg4300402054	Pkg4300403054	Pkg4300303054	Pkg4300403054	Pkg3300402064	Pkg3300403064	Pkg3300401064
GHGI [kg/m2]	1.9	1.95	2.05	1.9	1.92	1.9	1.89	1.95	1.94	1.91
% ICC	9.4%	9.5%	9.5%	9.8%	9.7%	9.8%	9.9%	10.0%	10.1%	10.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	113	113	113	113	113	113	113	113	113	113
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	52.8	53.5	47.8	52.7	52.1	53.1	51.2	53.4	51.8	52.9
Output: MEUI [kWh/(m2 * yr)]	70.3	75	84.1	69.9	71.6	70	69.4	74.4	73.8	71.6
Output: Better than ERS (%)	4580.0%	4420.0%	3990.0%	4590.0%	4540.0%	4590.0%	4600.0%	4450.0%	4470.0%	4540.0%
Output: Better than Envelope (%)	5060.0%	5020.0%	5540.0%	5090.0%	5130.0%	5060.0%	5240.0%	5020.0%	5170.0%	5060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8768	8438	7839	8792	8673	8784	8826	8493	8536	8686
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,236.22	$ 1,189.83	$ 1,105.3	$ 1,239.69	$ 1,222.85	$ 1,238.52	$ 1,244.49	$ 1,197.47	$ 1,203.56	$ 1,224.67
Annual savings in carbon tax for electricity [$/year]	$ 4.38	$ 4.22	$ 3.92	$ 4.4	$ 4.34	$ 4.39	$ 4.41	$ 4.25	$ 4.27	$ 4.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,240.6	$ 1,194.05	$ 1,109.22	$ 1,244.08	$ 1,227.19	$ 1,242.91	$ 1,248.91	$ 1,201.72	$ 1,207.83	$ 1,229.01
Annual savings in GHG from electricity savings [kg CO2e/year]	96.4	92.8	86.2	96.7	95.4	96.6	97.1	93.4	93.9	95.5
Annual savings in natural gas [m3/year]	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79	15.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3	$ 146.3
Annual savings in carbon tax for natural gas [$/year]	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52	$ 36.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81	$ 182.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4	811.4
Net Present Value [$]	$ 7,453.68	$ 6,456.67	$ 4,945.31	$ 6,798.29	$ 6,509.57	$ 6,630.69	$ 6,604.68	$ 5,609.45	$ 5,439.39	$ 5,653.58
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	9.99	14.09	14.09	14.09	9.99	14.09	8.6
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 6,738.68	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 6,738.68	$ 6,738.68	$ 6,738.68
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	NBC elec heat	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.

LANEWAY Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,819.99	$ 15,917.49	$ 16,029.99	$ 16,165.	$ 16,262.5	$ 16,127.49	$ 15,725.	$ 15,822.5	$ 16,369.99	$ 16,198.74
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,761.62	$ 23,908.07	$ 24,077.04	$ 24,279.83	$ 24,426.28	$ 24,223.49	$ 23,618.95	$ 23,765.4	$ 24,587.72	$ 24,330.51
Net Present Value [$]	$ 12,275.1	$ 12,223.61	$ 12,171.91	$ 12,170.73	$ 12,154.48	$ 12,120.97	$ 12,117.02	$ 12,072.29	$ 12,046.35	$ 12,039.86
Incremental dollars per GHG saving	$ 132.05	$ 132.65	$ 133.25	$ 133.71	$ 134.18	$ 133.84	$ 132.37	$ 132.96	$ 84.34	$ 134.43
Auxiliary Energy Required Heating [GJ/yr]	12.8	12.6	12.3	11.9	11.6	12.1	13.3	13.1	12.8	12.2
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	14.3	15.8
Annual Energy Space Heating [GJ/yr]	7.6	7.5	7.4	7.2	7.1	7.3	7.9	7.8	7.6	7.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	51.4	51.4	51.3	51.1	51	51.2	51.8	51.7	50	51.2
Design Heating Load [W]	3610.9	3563.7	3573.9	3539.1	3491.9	3526.8	3749.7	3702.5	3610.9	3536
Annual Energy Electricity [kWh/yr]	9906.2	9888.3	9864.7	9812.7	9781.1	9846.6	10004.5	9984	9907.6	9850.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,338.41	$ 1,335.88	$ 1,332.54	$ 1,325.18	$ 1,320.71	$ 1,329.98	$ 1,352.32	$ 1,349.42	$ 1,338.61	$ 1,330.52
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	423.9	423.9	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	26990	27206	27638	28286	28502	27854	28268	28484	26992	27422
Upgrade Package List	Pkg3300201053	Pkg3300202053	Pkg3300301053	Pkg3300401053	Pkg3300402053	Pkg3300302053	Pkg3300401052	Pkg3300402052	Pkg3300201053	Pkg3300203053
GHGI [kg/m2]	13.21	13.21	13.2	13.19	13.19	13.2	13.22	13.22	12.14	13.2
% ICC	8.0%	8.0%	8.1%	8.1%	8.2%	8.1%	7.9%	8.0%	8.2%	8.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	113	113	113	113	113	113	113	113	113	113
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	51	50.2	49.1	47.2	46.4	48.2	53.1	52.3	51.1	48.7
Output: MEUI [kWh/(m2 * yr)]	102.4	102.1	101.7	101	100.5	101.5	103.7	103.4	96.6	101.6
Output: Better than ERS (%)	3670.0%	3670.0%	3680.0%	3710.0%	3720.0%	3690.0%	3620.0%	3630.0%	3840.0%	3690.0%
Output: Better than Envelope (%)	5240.0%	5320.0%	5430.0%	5580.0%	5690.0%	5500.0%	5060.0%	5130.0%	5240.0%	5460.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10913	10931	10955	11007	11038	10973	10815	10836	10912	10969
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,538.78	$ 1,541.3	$ 1,544.63	$ 1,551.96	$ 1,556.41	$ 1,547.18	$ 1,524.92	$ 1,527.81	$ 1,538.58	$ 1,546.64
Annual savings in carbon tax for electricity [$/year]	$ 5.46	$ 5.47	$ 5.48	$ 5.5	$ 5.52	$ 5.49	$ 5.41	$ 5.42	$ 5.46	$ 5.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,544.23	$ 1,546.76	$ 1,550.1	$ 1,557.46	$ 1,561.93	$ 1,552.67	$ 1,530.32	$ 1,533.22	$ 1,544.03	$ 1,552.13
Annual savings in GHG from electricity savings [kg CO2e/year]	120	120.2	120.5	121.1	121.4	120.7	119	119.2	120	120.7
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	0	0	1.44	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ 13.36	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ 3.33	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 16.69	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	74.1	0.2
Net Present Value [$]	$ 12,275.1	$ 12,223.61	$ 12,171.91	$ 12,170.73	$ 12,154.48	$ 12,120.97	$ 12,117.02	$ 12,072.29	$ 12,046.35	$ 12,039.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	9.99	9.99	8.6	9.99	8.6	14.09
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 663.78	$ 663.78	$ 873.78	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 663.78	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

LANEWAY Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,455.13	$ 5,552.63	$ 5,633.63	$ 5,755.13	$ 5,836.13	$ 5,852.63	$ 5,933.63	$ 6,118.91	$ 6,216.41	$ 6,328.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 8,193.61	$ 8,340.05	$ 8,461.71	$ 8,644.21	$ 8,765.87	$ 8,790.65	$ 8,912.31	$ 9,190.6	$ 9,337.05	$ 9,506.02
Net Present Value [$]	$ 18,204.15	$ 18,304.03	$ 17,349.93	$ 18,168.15	$ 17,209.06	$ 18,268.02	$ 17,313.68	$ 17,222.31	$ 17,322.91	$ 17,436.82
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	26.3	26.1	27.3	26.3	27.6	26.1	27.3	26.8	26.5	26.2
Annual Energy DHW [GJ/yr]	24.5	24.5	24.5	23.3	23.4	23.3	23.4	24.5	24.5	24.5
Annual Energy Space Heating [GJ/yr]	26.3	26.1	27.3	26.3	27.6	26.1	27.3	26.8	26.5	26.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	77.1	76.8	78	75.9	77.2	75.6	76.9	77.5	77.2	76.9
Design Heating Load [W]	6231.3	6180.8	6180.8	6231.3	6231.3	6180.8	6180.8	6264.4	6213.9	6224.2
Annual Energy Electricity [kWh/yr]	14606	14529.3	14865.9	14606	14944.4	14529.3	14865.9	14729.5	14652.6	14564.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,003.43	$ 1,992.58	$ 2,040.21	$ 2,003.43	$ 2,051.32	$ 1,992.58	$ 2,040.21	$ 2,020.91	$ 2,010.03	$ 1,997.58
Annual Energy Natural Gas [m3/yr]	657.8	657.8	658.6	626.3	627.1	626.3	627.1	657.8	657.8	657.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 283.75	$ 283.75	$ 284.1	$ 270.16	$ 270.51	$ 270.16	$ 270.51	$ 283.75	$ 283.75	$ 283.75
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	34923	35193	35139	34925	34871	35195	35141	35463	35841	36435
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg2200102021	Pkg2200101031	Pkg2200101021	Pkg2200102031	Pkg2200102021	Pkg2200201031	Pkg2200202031	Pkg2200301031
GHGI [kg/m2]	20.38	20.36	20.44	19.51	19.59	19.5	19.57	20.39	20.38	20.37
% ICC	2.7%	2.8%	2.8%	2.9%	2.9%	2.9%	3.0%	3.1%	3.1%	3.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	165	165	165	165	165	165	165	165	165	165
Target MEUI cooling [kWh/(m2 * yr)]	193	193	193	193	193	193	193	193	193	193
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	105	103.9	108.7	105	109.8	103.9	108.7	106.8	105.6	104.4
Output: MEUI [kWh/(m2 * yr)]	205.1	204	208.9	200.4	205.4	199.3	204.2	206.8	205.7	204.5
Output: Better than ERS (%)	2100.0%	2130.0%	2010.0%	2220.0%	2090.0%	2250.0%	2120.0%	2060.0%	2090.0%	2120.0%
Output: Better than Envelope (%)	1490.0%	1550.0%	1170.0%	1490.0%	1070.0%	1550.0%	1170.0%	1330.0%	1420.0%	1520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9918	9995	9658	9918	9580	9995	9658	9795	9872	9960
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,398.47	$ 1,409.28	$ 1,361.82	$ 1,398.47	$ 1,350.75	$ 1,409.28	$ 1,361.82	$ 1,381.05	$ 1,391.9	$ 1,404.3
Annual savings in carbon tax for electricity [$/year]	$ 4.96	$ 5.	$ 4.83	$ 4.96	$ 4.79	$ 5.	$ 4.83	$ 4.9	$ 4.94	$ 4.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,403.43	$ 1,414.28	$ 1,366.65	$ 1,403.43	$ 1,355.54	$ 1,414.28	$ 1,366.65	$ 1,385.95	$ 1,396.83	$ 1,409.28
Annual savings in GHG from electricity savings [kg CO2e/year]	109.1	109.9	106.2	109.1	105.4	109.9	106.2	107.7	108.6	109.6
Annual savings in natural gas [m3/year]	8.34	8.34	8.37	7.16	7.19	7.16	7.19	8.34	8.34	8.34
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 77.26	$ 77.26	$ 77.53	$ 66.38	$ 66.66	$ 66.38	$ 66.66	$ 77.26	$ 77.26	$ 77.26
Annual savings in carbon tax for natural gas [$/year]	$ 19.28	$ 19.28	$ 19.35	$ 16.57	$ 16.64	$ 16.57	$ 16.64	$ 19.28	$ 19.28	$ 19.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 96.54	$ 96.54	$ 96.88	$ 82.95	$ 83.3	$ 82.95	$ 83.3	$ 96.54	$ 96.54	$ 96.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	428.5	428.5	430	368.2	369.7	368.2	369.7	428.5	428.5	428.5
Net Present Value [$]	$ 18,204.15	$ 18,304.03	$ 17,349.93	$ 18,168.15	$ 17,209.06	$ 18,268.02	$ 17,313.68	$ 17,222.31	$ 17,322.91	$ 17,436.82
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	9.99	8.6	8.6	9.99	9.99	8.6	9.99	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$ 663.78	$ 873.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$ 550.

LANEWAY Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 9,617.77	$ 9,655.28	$ 9,752.78	$ 9,810.27	$ 9,810.27	$ 9,912.85	$ 9,899.02	$ 9,907.77	$ 9,907.77	$ 10,010.35
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 14,445.89	$ 14,502.23	$ 14,648.68	$ 14,735.03	$ 14,735.03	$ 14,889.1	$ 14,868.33	$ 14,881.47	$ 14,881.47	$ 15,035.55
Net Present Value [$]	$ 11,410.23	$ 11,610.82	$ 11,718.54	$ 11,220.29	$ 11,208.97	$ 11,905.02	$ 11,501.82	$ 11,329.11	$ 11,317.24	$ 12,014.02
Incremental dollars per GHG saving	$ 10.62	$ 10.65	$ 10.75	$ 10.84	$ 10.84	$ 10.91	$ 10.92	$ 10.93	$ 10.93	$ 11.01
Auxiliary Energy Required Heating [GJ/yr]	27.8	27.5	27.2	27.8	27.8	27.7	27.3	27.5	27.6	27.4
Annual Energy DHW [GJ/yr]	9	9	9	9	9	9	9	9	9	9
Annual Energy Space Heating [GJ/yr]	27.8	27.5	27.2	27.8	27.8	27.7	27.3	27.5	27.6	27.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	0.6	1.5	1.5	1.5	0.6
Total Energy [GJ/yr]	64	63.6	63.3	64	64	62.9	63.4	63.7	63.7	62.6
Design Heating Load [W]	4444.1	4456.8	4406.3	4366.4	4486.5	5401.8	4414.4	4315.9	4436	5351.3
Annual Energy Electricity [kWh/yr]	17768.3	17675.8	17596.1	17767.3	17771.7	17461.5	17623.5	17687.2	17691.8	17381.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,450.9	$ 2,437.81	$ 2,426.53	$ 2,450.76	$ 2,451.38	$ 2,407.49	$ 2,430.41	$ 2,439.42	$ 2,440.07	$ 2,396.14
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	38839	39271	39487	41863	37993	35041	39055	42079	38209	35311
Upgrade Package List	Pkg2300302033	Pkg2300401033	Pkg2300402033	Pkg3300201033	Pkg2300201034	Pkg2200101051	Pkg2300303033	Pkg3300202033	Pkg2300202034	Pkg2200102051
GHGI [kg/m2]	2.8	2.79	2.78	2.8	2.8	2.76	2.78	2.79	2.79	2.74
% ICC	4.8%	4.9%	4.9%	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	165	165	165	165	165	165	165	165	165	165
Target MEUI cooling [kWh/(m2 * yr)]	193	193	193	193	193	193	193	193	193	193
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	110.9	109.6	108.5	110.9	111	110.2	108.9	109.8	109.8	109.1
Output: MEUI [kWh/(m2 * yr)]	152.8	151.5	150.3	152.8	152.9	148.4	150.7	151.6	151.7	147.3
Output: Better than ERS (%)	2900.0%	2950.0%	2980.0%	2900.0%	2900.0%	3030.0%	2970.0%	2940.0%	2940.0%	3060.0%
Output: Better than Envelope (%)	1000.0%	1100.0%	1200.0%	1000.0%	1000.0%	1040.0%	1170.0%	1100.0%	1070.0%	1130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6756	6848	6928	6757	6752	7063	6901	6837	6832	7143
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 952.58	$ 965.62	$ 976.86	$ 952.72	$ 952.1	$ 995.84	$ 973.	$ 964.02	$ 963.37	$ 1,007.15
Annual savings in carbon tax for electricity [$/year]	$ 3.38	$ 3.42	$ 3.46	$ 3.38	$ 3.38	$ 3.53	$ 3.45	$ 3.42	$ 3.42	$ 3.57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 955.96	$ 969.05	$ 980.33	$ 956.1	$ 955.48	$ 999.37	$ 976.45	$ 967.44	$ 966.78	$ 1,010.72
Annual savings in GHG from electricity savings [kg CO2e/year]	74.3	75.3	76.2	74.3	74.3	77.7	75.9	75.2	75.2	78.6
Annual savings in natural gas [m3/year]	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82
Annual savings in carbon tax for natural gas [$/year]	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	831	831	831	831	831	831	831	831	831	831
Net Present Value [$]	$ 11,410.23	$ 11,610.82	$ 11,718.54	$ 11,220.29	$ 11,208.97	$ 11,905.02	$ 11,501.82	$ 11,329.11	$ 11,317.24	$ 12,014.02
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	8.6	8.6	14.09	9.99	9.99	9.99
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 135.	$ 513.75	$ 232.5	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 4,470.71	$ 836.99	$ 836.99	$ 836.99	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR10	NA	BC EffR14	BC EffR10	BC EffR10	NA
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 1,008.79	$ 1,008.79	$ 663.78	$ 663.78	$.	$ 873.78	$ 663.78	$ 663.78	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	NA	HRV sre 75	HRV sre 75	HRV sre 85	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$.	$ 1,800.	$ 1,800.	$ 2,300.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 9,626.41	$ 10,176.41	$ 10,476.41	$ 8,152.63	$ 8,055.13	$ 8,702.63	$ 8,605.13	$ 9,002.63	$ 8,905.13	$ 8,136.13
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 14,458.87	$ 15,284.97	$ 15,735.57	$ 12,245.25	$ 12,098.81	$ 13,071.35	$ 12,924.91	$ 13,521.95	$ 13,375.51	$ 12,220.47
Net Present Value [$]	$ 21,763.42	$ 21,546.92	$ 21,469.24	$ 21,014.79	$ 21,010.04	$ 20,861.76	$ 20,857.01	$ 20,826.49	$ 20,821.74	$ 20,781.17
Incremental dollars per GHG saving	$ 71.89	$ 48.16	$ 39.87	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	27.7	27.7	27.7	26.1	26.3	26.1	26.3	26.1	26.3	27.6
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	26.3	26.3	24.5	24.5	23.3	23.3	26.3
Annual Energy Space Heating [GJ/yr]	16.6	16.6	16.6	16.1	16.3	16.1	16.3	16.1	16.3	16.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	60.6	59.1	58.1	70.6	70.7	68.8	69	67.7	67.8	71
Design Heating Load [W]	5906.4	5906.4	5906.4	6250	6300.5	6250	6300.5	6250	6300.5	6300.5
Annual Energy Electricity [kWh/yr]	12331.1	12332.9	12334.1	12311.6	12351.3	12311.6	12351.3	12311.6	12351.3	12406.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,681.54	$ 1,681.79	$ 1,681.96	$ 1,678.78	$ 1,684.39	$ 1,678.78	$ 1,684.39	$ 1,678.78	$ 1,684.39	$ 1,692.2
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	705.4	705.4	658	658	626.4	626.4	706.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 304.28	$ 304.28	$ 283.84	$ 283.84	$ 270.21	$ 270.21	$ 304.59
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	36818	36820	36822	35192	34922	35194	34924	35196	34926	34868
Upgrade Package List	Pkg2200302031	Pkg2200302031	Pkg2200302031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200101021
GHGI [kg/m2]	13.87	12.76	12.02	21.32	21.33	20.02	20.03	19.15	19.16	21.36
% ICC	4.8%	5.1%	5.3%	4.1%	4.1%	4.4%	4.3%	4.5%	4.5%	4.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	165	165	165	165	165	165	165	165	165	165
Target MEUI cooling [kWh/(m2 * yr)]	193	193	193	193	193	193	193	193	193	193
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	110.5	110.5	110.6	103.9	105	103.9	105	103.9	105	109.8
Output: MEUI [kWh/(m2 * yr)]	138.2	132.2	128.2	177.8	178.4	170.8	171.4	166.1	166.7	179.7
Output: Better than ERS (%)	3560.0%	3720.0%	3830.0%	2990.0%	2980.0%	3170.0%	3150.0%	3280.0%	3270.0%	2950.0%
Output: Better than Envelope (%)	1040.0%	1040.0%	1040.0%	1550.0%	1490.0%	1550.0%	1490.0%	1550.0%	1490.0%	1070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12193	12191	12190	12213	12173	12213	12173	12213	12173	12118
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,719.23	$ 1,718.97	$ 1,718.8	$ 1,721.98	$ 1,716.38	$ 1,721.98	$ 1,716.38	$ 1,721.98	$ 1,716.38	$ 1,708.6
Annual savings in carbon tax for electricity [$/year]	$ 6.1	$ 6.1	$ 6.1	$ 6.11	$ 6.09	$ 6.11	$ 6.09	$ 6.11	$ 6.09	$ 6.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,725.32	$ 1,725.07	$ 1,724.9	$ 1,728.08	$ 1,722.47	$ 1,728.08	$ 1,722.47	$ 1,728.08	$ 1,722.47	$ 1,714.65
Annual savings in GHG from electricity savings [kg CO2e/year]	134.1	134.1	134.1	134.3	133.9	134.3	133.9	134.3	133.9	133.3
Annual savings in natural gas [m3/year]	0	1.5	2.5	10.11	10.11	8.35	8.35	7.17	7.17	10.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ 13.91	$ 23.2	$ 93.69	$ 93.69	$ 77.33	$ 77.33	$ 66.42	$ 66.42	$ 93.93
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ 3.47	$ 5.79	$ 23.38	$ 23.38	$ 19.3	$ 19.3	$ 16.58	$ 16.58	$ 23.44
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ 17.38	$ 28.99	$ 117.07	$ 117.07	$ 96.63	$ 96.63	$ 82.99	$ 82.99	$ 117.37
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	77.2	128.7	519.6	519.6	428.9	428.9	368.4	368.4	521
Net Present Value [$]	$ 21,763.42	$ 21,546.92	$ 21,469.24	$ 21,014.79	$ 21,010.04	$ 20,861.76	$ 20,857.01	$ 20,826.49	$ 20,821.74	$ 20,781.17
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	9.99	9.99	9.99	8.6	9.99	8.6	9.99	8.6	8.6
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 232.5	$ 232.5	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 873.78	$ 873.78	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.

LANEWAY Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 11,686.27	$ 11,783.77	$ 11,896.27	$ 11,970.03	$ 11,993.77	$ 12,031.28	$ 12,053.77	$ 12,065.02	$ 12,091.28	$ 12,128.78
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,552.78	$ 17,699.22	$ 17,868.2	$ 17,978.99	$ 18,014.64	$ 18,070.98	$ 18,104.76	$ 18,121.66	$ 18,161.1	$ 18,217.43
Net Present Value [$]	$ 20,135.01	$ 20,102.88	$ 20,113.44	$ 19,673.78	$ 20,120.74	$ 20,062.78	$ 19,705.43	$ 19,974.27	$ 19,689.47	$ 20,094.37
Incremental dollars per GHG saving	$ 86.06	$ 86.65	$ 87.09	$ 88.67	$ 87.55	$ 87.88	$ 88.96	$ 88.26	$ 89.17	$ 88.21
Auxiliary Energy Required Heating [GJ/yr]	24.6	24.3	24	24.6	23.7	23.4	24.7	23.8	24.4	23.2
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
Annual Energy Space Heating [GJ/yr]	14.9	14.8	14.6	15	14.5	14.4	15	14.6	14.8	14.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	60	59.9	59.7	60.2	59.5	59.6	60	59.7	60	59.4
Design Heating Load [W]	4587	4536.6	4546.9	4654.3	4496.4	4509.1	4536.6	4506.8	4549.3	4458.6
Annual Energy Electricity [kWh/yr]	12163.5	12138.1	12090.3	12232.4	12049.6	12057.5	12187.6	12078.8	12179.2	12007.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,657.82	$ 1,654.23	$ 1,647.46	$ 1,667.57	$ 1,641.7	$ 1,642.82	$ 1,661.23	$ 1,645.84	$ 1,660.04	$ 1,635.73
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	37970	38186	38618	39680	38834	39266	42704	38402	43136	39482
Upgrade Package List	Pkg2300201033	Pkg2300202033	Pkg2300301033	Pkg2300403032	Pkg2300302033	Pkg2300401033	Pkg3300302032	Pkg2300203033	Pkg3300401032	Pkg2300402033
GHGI [kg/m2]	13.84	13.83	13.83	13.86	13.83	13.83	13.85	13.83	13.85	13.82
% ICC	5.9%	5.9%	6.0%	6.0%	6.0%	6.1%	6.1%	6.1%	6.1%	6.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	98.1	97	95.7	98	94.6	93.4	98.6	95	97.4	92.3
Output: MEUI [kWh/(m2 * yr)]	135.6	135.3	134.6	136.5	134	134	136	134.4	135.8	133.3
Output: Better than ERS (%)	3620.0%	3630.0%	3660.0%	3600.0%	3680.0%	3670.0%	3620.0%	3660.0%	3620.0%	3690.0%
Output: Better than Envelope (%)	2040.0%	2140.0%	2230.0%	2040.0%	2330.0%	2430.0%	2010.0%	2300.0%	2100.0%	2490.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12361	12386	12434	12292	12475	12467	12337	12445	12345	12517
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,742.86	$ 1,746.44	$ 1,753.18	$ 1,733.14	$ 1,758.92	$ 1,757.8	$ 1,739.46	$ 1,754.8	$ 1,740.64	$ 1,764.87
Annual savings in carbon tax for electricity [$/year]	$ 6.18	$ 6.19	$ 6.22	$ 6.15	$ 6.24	$ 6.23	$ 6.17	$ 6.22	$ 6.17	$ 6.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,749.04	$ 1,752.63	$ 1,759.4	$ 1,739.29	$ 1,765.16	$ 1,764.04	$ 1,745.63	$ 1,761.02	$ 1,746.82	$ 1,771.13
Annual savings in GHG from electricity savings [kg CO2e/year]	136	136.2	136.8	135.2	137.2	137.1	135.7	136.9	135.8	137.7
Annual savings in natural gas [m3/year]	0	0	0	0	0	0	0	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Net Present Value [$]	$ 20,135.01	$ 20,102.88	$ 20,113.44	$ 19,673.78	$ 20,120.74	$ 20,062.78	$ 19,705.43	$ 19,974.27	$ 19,689.47	$ 20,094.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	14.09	9.99	8.6	9.99	14.09	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR80	CeilR60	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 232.5	$ 513.75	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR10	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 663.78	$ 663.78	$ 873.78	$ 1,008.79	$ 873.78	$ 1,008.79	$ 873.78	$ 663.78	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

LANEWAY Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,139.	$ 14,217.75	$ 14,236.5	$ 14,339.	$ 14,339.	$ 14,382.74	$ 14,386.5	$ 14,391.49	$ 14,391.49	$ 14,436.5
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,236.78	$ 21,355.06	$ 21,383.22	$ 21,537.18	$ 21,537.18	$ 21,602.88	$ 21,608.52	$ 21,616.02	$ 21,616.02	$ 21,683.62
Net Present Value [$]	$ 11,902.06	$ 11,832.07	$ 12,003.76	$ 11,814.17	$ 11,774.91	$ 11,804.75	$ 11,760.82	$ 11,658.33	$ 11,624.55	$ 11,916.23
Incremental dollars per GHG saving	$ 15.26	$ 15.34	$ 15.35	$ 15.47	$ 15.47	$ 15.51	$ 15.52	$ 15.53	$ 15.53	$ 15.56
Auxiliary Energy Required Heating [GJ/yr]	22.1	21.6	21.8	21.4	21.5	21.9	20.7	22.1	22.1	21.1
Annual Energy DHW [GJ/yr]	7.7	8.2	7.7	8.2	8.2	7.7	9	7.7	7.7	8.2
Annual Energy Space Heating [GJ/yr]	22.1	21.6	21.8	21.4	21.5	21.9	20.7	22.1	22.1	21.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	57	56.9	56.7	56.8	56.9	56.8	56.8	56.9	57	56.5
Design Heating Load [W]	3946.8	3866.6	3896.3	3778.4	3898.5	3904.4	3679.6	3805.9	3926	3727.9
Annual Energy Electricity [kWh/yr]	15821.1	15817.7	15743.7	15777.5	15792.8	15764.2	15779.8	15817.7	15830.8	15700
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,175.37	$ 2,174.89	$ 2,164.42	$ 2,169.2	$ 2,171.37	$ 2,167.32	$ 2,169.53	$ 2,174.89	$ 2,176.74	$ 2,158.23
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	39383	39813	39599	43269	39399	39167	43501	42191	38321	43485
Upgrade Package List	Pkg2300401053	Pkg2300403053	Pkg2300402053	Pkg3300401053	Pkg2300401054	Pkg2300303053	Pkg3300402054	Pkg3300202053	Pkg2300202054	Pkg3300402053
GHGI [kg/m2]	2.5	2.5	2.48	2.49	2.49	2.49	2.49	2.5	2.5	2.48
% ICC	7.1%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	88	86	86.9	85.4	85.6	87.2	82.4	88	88.2	84.3
Output: MEUI [kWh/(m2 * yr)]	124.9	124.8	123.8	124.2	124.5	124.1	124.3	124.8	125	123.1
Output: Better than ERS (%)	3680.0%	3690.0%	3710.0%	3700.0%	3690.0%	3700.0%	3700.0%	3690.0%	3680.0%	3740.0%
Output: Better than Envelope (%)	2850.0%	3010.0%	2940.0%	3070.0%	3040.0%	2910.0%	3300.0%	2850.0%	2850.0%	3170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8703	8706	8780	8747	8731	8760	8744	8706	8693	8824
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,227.14	$ 1,227.62	$ 1,238.05	$ 1,233.28	$ 1,231.13	$ 1,235.16	$ 1,232.96	$ 1,227.62	$ 1,225.77	$ 1,244.21
Annual savings in carbon tax for electricity [$/year]	$ 4.35	$ 4.35	$ 4.39	$ 4.37	$ 4.37	$ 4.38	$ 4.37	$ 4.35	$ 4.35	$ 4.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,231.49	$ 1,231.97	$ 1,242.44	$ 1,237.66	$ 1,235.49	$ 1,239.54	$ 1,237.33	$ 1,231.97	$ 1,230.12	$ 1,248.62
Annual savings in GHG from electricity savings [kg CO2e/year]	95.7	95.8	96.6	96.2	96	96.4	96.2	95.8	95.6	97.1
Annual savings in natural gas [m3/year]	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17	16.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82	$ 149.82
Annual savings in carbon tax for natural gas [$/year]	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39	$ 37.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21	$ 187.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	831	831	831	831	831	831	831	831	831	831
Net Present Value [$]	$ 11,902.06	$ 11,832.07	$ 12,003.76	$ 11,814.17	$ 11,774.91	$ 11,804.75	$ 11,760.82	$ 11,658.33	$ 11,624.55	$ 11,916.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	14.09	9.99	8.6	8.6	14.09	9.99	9.99	9.99	9.99
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 513.75	$ 232.5	$ 135.	$ 135.	$ 513.75	$ 232.5	$ 232.5	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 663.78	$ 663.78	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$ 850.	$ 550.

LANEWAY Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC Effr14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 12,288.85	$ 12,386.35	$ 12,838.85	$ 12,936.35	$ 13,138.85	$ 13,236.35	$ 12,582.09	$ 12,484.59	$ 11,686.27	$ 11,993.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 18,457.85	$ 18,604.3	$ 19,283.95	$ 19,430.4	$ 19,734.55	$ 19,881.	$ 18,898.3	$ 18,751.85	$ 17,552.78	$ 18,014.64
Net Present Value [$]	$ 20,767.07	$ 20,734.21	$ 20,550.76	$ 20,517.89	$ 20,473.25	$ 20,440.2	$ 20,323.02	$ 20,319.36	$ 20,135.01	$ 20,120.74
Incremental dollars per GHG saving	$ 87.16	$ 87.66	$ 58.79	$ 59.15	$ 48.68	$ 48.99	$ 89.62	$ 89.18	$ 86.06	$ 87.55
Auxiliary Energy Required Heating [GJ/yr]	23.5	23.2	23.5	23.2	23.5	23.2	24.4	24.7	24.6	23.7
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	14.7	13.7	13.7	16.2	16.2	16.2	16.2
Annual Energy Space Heating [GJ/yr]	14.3	14.2	14.3	14.2	14.3	14.2	14.6	14.7	14.9	14.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.5	1.5
Total Energy [GJ/yr]	58.2	58.1	56.7	56.6	55.7	55.6	58.4	58.6	60	59.5
Design Heating Load [W]	5454	5403.5	5454	5403.5	5454	5403.5	5403.5	5454	4587	4496.4
Annual Energy Electricity [kWh/yr]	11683.9	11658.8	11685.7	11660.6	11686.8	11661.8	11742.5	11781.8	12163.5	12049.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,589.96	$ 1,586.41	$ 1,590.21	$ 1,586.66	$ 1,590.37	$ 1,586.83	$ 1,598.25	$ 1,603.81	$ 1,657.82	$ 1,641.7
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	393.7	366.8	366.8	434.1	434.1	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 158.22	$ 158.22	$ 187.26	$ 187.26	$ 187.26	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35036	35306	35038	35308	35040	35310	35252	34982	37970	38834
Upgrade Package List	Pkg2200101051	Pkg2200102051	Pkg2200101051	Pkg2200102051	Pkg2200101051	Pkg2200102051	Pkg2200102041	Pkg2200101041	Pkg2300201033	Pkg2300302033
GHGI [kg/m2]	13.77	12.66	13.77	12.66	11.92	11.92	13.78	13.78	13.84	13.83
% ICC	6.2%	6.2%	6.5%	6.5%	6.6%	6.7%	6.3%	6.3%	5.9%	6.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	125	125	125	125	125	125	125	125	125	125
Target MEUI cooling [kWh/(m2 * yr)]	153	153	153	153	153	153	153	153	153	153
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	93.6	92.5	93.7	92.6	93.7	92.6	97.2	98.4	98.1	94.6
Output: MEUI [kWh/(m2 * yr)]	128.9	128.5	122.9	122.6	118.9	118.6	130	130.6	135.6	134
Output: Better than ERS (%)	3820.0%	3830.0%	3970.0%	3990.0%	4080.0%	4090.0%	3790.0%	3770.0%	3620.0%	3680.0%
Output: Better than Envelope (%)	2390.0%	2490.0%	2390.0%	2490.0%	2390.0%	2490.0%	2100.0%	2010.0%	2040.0%	2330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12840	12865	12838	12864	12837	12862	12782	12742	12361	12475
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,810.48	$ 1,814.02	$ 1,810.23	$ 1,813.77	$ 1,810.07	$ 1,813.6	$ 1,802.22	$ 1,796.68	$ 1,742.86	$ 1,758.92
Annual savings in carbon tax for electricity [$/year]	$ 6.42	$ 6.43	$ 6.42	$ 6.43	$ 6.42	$ 6.43	$ 6.39	$ 6.37	$ 6.18	$ 6.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,816.9	$ 1,820.45	$ 1,816.65	$ 1,820.2	$ 1,816.49	$ 1,820.03	$ 1,808.61	$ 1,803.05	$ 1,749.04	$ 1,765.16
Annual savings in GHG from electricity savings [kg CO2e/year]	141.2	141.5	141.2	141.5	141.2	141.5	140.6	140.2	136	137.2
Annual savings in natural gas [m3/year]	0	0	1.5	1.5	2.5	2.5	0	0	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ .03	$ 13.91	$ 13.91	$ 23.2	$ 23.2	$ .03	$ .03	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ .01	$ 3.47	$ 3.47	$ 5.79	$ 5.79	$ .01	$ .01	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ .04	$ 17.38	$ 17.38	$ 28.99	$ 28.99	$ .04	$ .04	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	0.2	77.2	77.2	128.7	128.7	0.2	0.2	0.2	0.2
Net Present Value [$]	$ 20,767.07	$ 20,734.21	$ 20,550.76	$ 20,517.89	$ 20,473.25	$ 20,440.2	$ 20,323.02	$ 20,319.36	$ 20,135.01	$ 20,120.74
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	8.6	9.99	9.99	8.6	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,666.45	$ 4,666.45	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	BC Effr10	BC Effr14
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 663.78	$ 873.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$.	$.

LANEWAY Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 19,311.72	$ 19,861.72	$ 20,030.47	$ 20,161.72	$ 20,176.71	$ 20,311.72	$ 20,580.47	$ 20,726.71	$ 20,861.72	$ 20,880.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,006.2	$ 29,832.3	$ 30,085.77	$ 30,282.9	$ 30,305.42	$ 30,508.2	$ 30,911.87	$ 31,131.52	$ 31,334.3	$ 31,362.47
Net Present Value [$]	$ 16,183.72	$ 15,967.95	$ 15,525.77	$ 15,890.45	$ 15,403.27	$ 15,454.31	$ 15,310.	$ 15,187.13	$ 15,238.18	$ 15,232.5
Incremental dollars per GHG saving	$ 127.47	$ 86.81	$ 132.04	$ 71.93	$ 132.92	$ 133.1	$ 89.83	$ 90.43	$ 90.7	$ 74.41
Auxiliary Energy Required Heating [GJ/yr]	15.3	15.3	15.2	15.3	15.2	14.7	15.2	15.3	14.7	15.2
Annual Energy DHW [GJ/yr]	16.2	14.7	16.2	13.7	16.2	16.2	14.7	14.7	14.7	13.7
Annual Energy Space Heating [GJ/yr]	9.8	9.8	9.7	9.8	9.7	9.4	9.7	9.7	9.4	9.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	54.8	53.3	54.7	52.3	54.7	54.4	53.2	53.2	52.9	52.2
Design Heating Load [W]	3430.3	3430.3	3336	3430.3	3344.1	3306.3	3336	3344.1	3306.3	3336
Annual Energy Electricity [kWh/yr]	10736.3	10737.9	10712.7	10739	10703.5	10631.2	10714.3	10705.2	10632.9	10715.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,455.87	$ 1,456.1	$ 1,452.53	$ 1,456.25	$ 1,451.23	$ 1,441.	$ 1,452.76	$ 1,451.47	$ 1,441.24	$ 1,452.91
Annual Energy Natural Gas [m3/yr]	434.1	393.7	434.1	366.8	434.1	434.1	393.7	393.7	393.7	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 187.26	$ 158.22	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 169.83	$ 158.22
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43766	43768	44774	43770	44630	44918	44776	44632	44920	44778
Upgrade Package List	Pkg3300403064	Pkg3300403064	Pkg4300402064	Pkg3300403064	Pkg4300303064	Pkg4300403064	Pkg4300402064	Pkg4300303064	Pkg4300403064	Pkg4300402064
GHGI [kg/m2]	13.62	12.51	13.62	11.77	13.61	13.6	12.51	12.5	12.49	11.77
% ICC	9.7%	10.0%	10.1%	10.1%	10.2%	10.2%	10.4%	10.4%	10.5%	10.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	61	61	60.6	61.1	60.8	58.7	60.7	60.8	58.8	60.7
Output: MEUI [kWh/(m2 * yr)]	115.4	109.4	115.1	105.4	114.9	113.9	109.1	109	107.9	105.1
Output: Better than ERS (%)	4180.0%	4340.0%	4190.0%	4440.0%	4190.0%	4220.0%	4350.0%	4350.0%	4380.0%	4450.0%
Output: Better than Envelope (%)	5050.0%	5050.0%	5080.0%	5050.0%	5080.0%	5240.0%	5080.0%	5050.0%	5240.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13788	13786	13812	13785	13821	13893	13810	13819	13891	13809
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,944.09	$ 1,943.87	$ 1,947.42	$ 1,943.71	$ 1,948.72	$ 1,958.91	$ 1,947.2	$ 1,948.48	$ 1,958.67	$ 1,947.04
Annual savings in carbon tax for electricity [$/year]	$ 6.89	$ 6.89	$ 6.91	$ 6.89	$ 6.91	$ 6.95	$ 6.9	$ 6.91	$ 6.95	$ 6.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,950.99	$ 1,950.76	$ 1,954.33	$ 1,950.61	$ 1,955.63	$ 1,965.86	$ 1,954.1	$ 1,955.39	$ 1,965.62	$ 1,953.95
Annual savings in GHG from electricity savings [kg CO2e/year]	151.7	151.6	151.9	151.6	152	152.8	151.9	152	152.8	151.9
Annual savings in natural gas [m3/year]	0	1.5	0	2.5	0	0	1.5	1.5	1.5	2.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ 13.91	$ .03	$ 23.2	$ .03	$ .03	$ 13.91	$ 13.91	$ 13.91	$ 23.2
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ 3.47	$ .01	$ 5.79	$ .01	$ .01	$ 3.47	$ 3.47	$ 3.47	$ 5.79
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ 17.38	$ .04	$ 28.99	$ .04	$ .04	$ 17.38	$ 17.38	$ 17.38	$ 28.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	77.2	0.2	128.7	0.2	0.2	77.2	77.2	77.2	128.7
Net Present Value [$]	$ 16,183.72	$ 15,967.95	$ 15,525.77	$ 15,890.45	$ 15,403.27	$ 15,454.31	$ 15,310.	$ 15,187.13	$ 15,238.18	$ 15,232.5
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	9.99	14.09	14.09	14.09	9.99	14.09	14.09	9.99
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 550.	$ 550.	$ 850.

LANEWAY Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 20,161.72	$ 20,880.47	$ 21,026.71	$ 21,161.72	$ 19,861.72	$ 20,580.47	$ 20,726.71	$ 20,861.72	$ 19,311.72	$ 20,030.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 30,282.9	$ 31,362.47	$ 31,582.12	$ 31,784.9	$ 29,832.3	$ 30,911.87	$ 31,131.52	$ 31,334.3	$ 29,006.2	$ 30,085.77
Net Present Value [$]	$ 15,890.45	$ 15,232.5	$ 15,109.63	$ 15,161.04	$ 15,967.95	$ 15,310.	$ 15,187.13	$ 15,238.18	$ 16,183.72	$ 15,525.77
Incremental dollars per GHG saving	$ 71.93	$ 74.41	$ 74.91	$ 75.18	$ 86.81	$ 89.83	$ 90.43	$ 90.7	$ 127.47	$ 132.04
Auxiliary Energy Required Heating [GJ/yr]	15.3	15.2	15.3	14.8	15.3	15.2	15.3	14.7	15.3	15.2
Annual Energy DHW [GJ/yr]	13.7	13.7	13.7	13.7	14.7	14.7	14.7	14.7	16.2	16.2
Annual Energy Space Heating [GJ/yr]	9.8	9.7	9.7	9.4	9.8	9.7	9.7	9.4	9.8	9.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	52.3	52.2	52.2	51.9	53.3	53.2	53.2	52.9	54.8	54.7
Design Heating Load [W]	3430.3	3336	3344.1	3306.3	3430.3	3336	3344.1	3306.3	3430.3	3336
Annual Energy Electricity [kWh/yr]	10739	10706.3	10706.3	10633.9	10737.9	10714.3	10705.2	10632.9	10736.3	10712.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,456.25	$ 1,452.91	$ 1,451.63	$ 1,441.38	$ 1,456.1	$ 1,452.76	$ 1,451.47	$ 1,441.24	$ 1,455.87	$ 1,452.53
Annual Energy Natural Gas [m3/yr]	366.8	366.8	366.8	366.8	393.7	393.7	393.7	393.7	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 158.22	$ 158.22	$ 158.22	$ 158.22	$ 169.83	$ 169.83	$ 169.83	$ 169.83	$ 187.26	$ 187.26
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43770	44778	44634	44922	43768	44776	44632	44920	43766	44774
Upgrade Package List	Pkg3300403064	Pkg4300402064	Pkg4300303064	Pkg4300403064	Pkg3300403064	Pkg4300402064	Pkg3300303064	Pkg4300403064	Pkg3300403064	Pkg4300402064
GHGI [kg/m2]	11.77	11.77	11.77	11.75	12.51	12.51	12.5	12.49	13.62	13.62
% ICC	10.1%	10.5%	10.6%	10.6%	10.0%	10.4%	10.4%	10.5%	9.7%	10.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	61.1	60.7	60.9	58.8	61	60.7	60.8	58.8	61	60.6
Output: MEUI [kWh/(m2 * yr)]	105.4	105.1	105	103.9	109.4	109.1	109	107.9	115.4	115.1
Output: Better than ERS (%)	4440.0%	4450.0%	4450.0%	4480.0%	4340.0%	4350.0%	4350.0%	4380.0%	4180.0%	4190.0%
Output: Better than Envelope (%)	5050.0%	5080.0%	5050.0%	5210.0%	5050.0%	5080.0%	5050.0%	5240.0%	5050.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13785	13809	13818	13890	13786	13810	13819	13891	13788	13812
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,943.71	$ 1,947.04	$ 1,948.32	$ 1,958.53	$ 1,943.87	$ 1,947.2	$ 1,948.48	$ 1,958.67	$ 1,944.09	$ 1,947.42
Annual savings in carbon tax for electricity [$/year]	$ 6.89	$ 6.9	$ 6.91	$ 6.95	$ 6.89	$ 6.9	$ 6.91	$ 6.95	$ 6.89	$ 6.91
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,950.61	$ 1,953.95	$ 1,955.23	$ 1,965.48	$ 1,950.76	$ 1,954.1	$ 1,955.39	$ 1,965.62	$ 1,950.99	$ 1,954.33
Annual savings in GHG from electricity savings [kg CO2e/year]	151.6	151.9	152	152.8	151.6	151.9	152	152.8	151.7	151.9
Annual savings in natural gas [m3/year]	2.5	2.5	2.5	2.5	1.5	1.5	1.5	1.5	0	0
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 23.2	$ 23.2	$ 23.2	$ 23.2	$ 13.91	$ 13.91	$ 13.91	$ 13.91	$ .03	$ .03
Annual savings in carbon tax for natural gas [$/year]	$ 5.79	$ 5.79	$ 5.79	$ 5.79	$ 3.47	$ 3.47	$ 3.47	$ 3.47	$ .01	$ .01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 28.99	$ 28.99	$ 28.99	$ 28.99	$ 17.38	$ 17.38	$ 17.38	$ 17.38	$ .04	$ .04
Annual savings in GHG from natural gas savings [kg CO2e/year]	128.7	128.7	128.7	128.7	77.2	77.2	77.2	77.2	0.2	0.2
Net Present Value [$]	$ 15,890.45	$ 15,232.5	$ 15,109.63	$ 15,161.04	$ 15,967.95	$ 15,310.	$ 15,187.13	$ 15,238.18	$ 16,183.72	$ 15,525.77
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	9.99	14.09	14.09	14.09	9.99	14.09	14.09	14.09	9.99
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 513.75	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$ 550.	$ 550.	$.	$.

LANEWAY Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 19,311.72	$ 19,861.72	$ 20,161.72	$ 20,030.47	$ 20,311.72	$ 20,176.71	$ 20,580.47	$ 20,861.72	$ 20,880.47	$ 20,726.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,006.2	$ 29,832.3	$ 30,282.9	$ 30,085.77	$ 30,508.2	$ 30,305.42	$ 30,911.87	$ 31,334.3	$ 31,362.47	$ 31,131.52
Net Present Value [$]	$ 16,183.72	$ 15,967.95	$ 15,890.45	$ 15,525.77	$ 15,454.31	$ 15,403.27	$ 15,310.	$ 15,238.18	$ 15,232.5	$ 15,187.13
Incremental dollars per GHG saving	$ 127.47	$ 86.81	$ 71.93	$ 132.04	$ 133.1	$ 132.92	$ 89.83	$ 90.7	$ 74.41	$ 90.43
Auxiliary Energy Required Heating [GJ/yr]	15.3	15.3	15.3	15.2	14.7	15.2	15.2	14.7	15.2	15.3
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	16.2	16.2	16.2	14.7	14.7	13.7	14.7
Annual Energy Space Heating [GJ/yr]	9.8	9.8	9.8	9.7	9.4	9.7	9.7	9.4	9.7	9.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	54.8	53.3	52.3	54.7	54.4	54.7	53.2	52.9	52.2	53.2
Design Heating Load [W]	3430.3	3430.3	3430.3	3336	3306.3	3344.1	3336	3306.3	3336	3344.1
Annual Energy Electricity [kWh/yr]	10736.3	10737.9	10739	10712.7	10631.2	10703.5	10714.3	10632.9	10715.4	10705.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,455.87	$ 1,456.1	$ 1,456.25	$ 1,452.53	$ 1,441.	$ 1,451.23	$ 1,452.76	$ 1,441.24	$ 1,452.91	$ 1,451.47
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	434.1	434.1	434.1	393.7	393.7	366.8	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 158.22	$ 169.83
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43766	43768	43770	44774	44918	44630	44776	44920	44778	44632
Upgrade Package List	Pkg3300403064	Pkg3300403064	Pkg3300403064	Pkg4300402064	Pkg4300403064	Pkg4300303064	Pkg4300402064	Pkg4300403064	Pkg4300402064	Pkg4300303064
GHGI [kg/m2]	13.62	12.51	11.77	13.62	13.6	13.61	12.51	12.49	11.77	12.5
% ICC	9.7%	10.0%	10.1%	10.1%	10.2%	10.2%	10.4%	10.5%	10.5%	10.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	61	61	61.1	60.6	58.7	60.8	60.7	58.8	60.7	60.8
Output: MEUI [kWh/(m2 * yr)]	115.4	109.4	105.4	115.1	113.9	114.9	109.1	107.9	105.1	109
Output: Better than ERS (%)	4180.0%	4340.0%	4440.0%	4190.0%	4220.0%	4190.0%	4350.0%	4380.0%	4450.0%	4350.0%
Output: Better than Envelope (%)	5050.0%	5050.0%	5050.0%	5080.0%	5240.0%	5080.0%	5080.0%	5240.0%	5080.0%	5050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13788	13786	13785	13812	13893	13821	13810	13891	13809	13819
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,944.09	$ 1,943.87	$ 1,943.71	$ 1,947.42	$ 1,958.91	$ 1,948.72	$ 1,947.2	$ 1,958.67	$ 1,947.04	$ 1,948.48
Annual savings in carbon tax for electricity [$/year]	$ 6.89	$ 6.89	$ 6.89	$ 6.91	$ 6.95	$ 6.91	$ 6.9	$ 6.95	$ 6.9	$ 6.91
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,950.99	$ 1,950.76	$ 1,950.61	$ 1,954.33	$ 1,965.86	$ 1,955.63	$ 1,954.1	$ 1,965.62	$ 1,953.95	$ 1,955.39
Annual savings in GHG from electricity savings [kg CO2e/year]	151.7	151.6	151.6	151.9	152.8	152	151.9	152.8	151.9	152
Annual savings in natural gas [m3/year]	0	1.5	2.5	0	0	0	1.5	1.5	2.5	1.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .03	$ 13.91	$ 23.2	$ .03	$ .03	$ .03	$ 13.91	$ 13.91	$ 23.2	$ 13.91
Annual savings in carbon tax for natural gas [$/year]	$ .01	$ 3.47	$ 5.79	$ .01	$ .01	$ .01	$ 3.47	$ 3.47	$ 5.79	$ 3.47
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .04	$ 17.38	$ 28.99	$ .04	$ .04	$ .04	$ 17.38	$ 17.38	$ 28.99	$ 17.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.2	77.2	128.7	0.2	0.2	0.2	77.2	77.2	128.7	77.2
Net Present Value [$]	$ 16,183.72	$ 15,967.95	$ 15,890.45	$ 15,525.77	$ 15,454.31	$ 15,403.27	$ 15,310.	$ 15,238.18	$ 15,232.5	$ 15,187.13
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	9.99	14.09	14.09	9.99	14.09	9.99	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 513.75	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 232.5	$ 513.75	$ 232.5	$ 513.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68	$ 6,738.68
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.

LANEWAY Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 4,905.13	$ 5,002.63	$ 5,005.13	$ 5,102.63	$ 5,183.63	$ 5,204.09	$ 5,255.13	$ 5,301.59	$ 5,352.63	$ 5,428.09
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 7,367.51	$ 7,513.95	$ 7,517.71	$ 7,664.15	$ 7,785.81	$ 7,816.54	$ 7,893.21	$ 7,962.99	$ 8,039.65	$ 8,152.99
Net Present Value [$]	$ 21,331.36	$ 21,453.15	$ 20,356.97	$ 20,485.69	$ 19,454.7	$ 19,240.15	$ 19,303.22	$ 19,370.52	$ 19,426.83	$ 12,349.06
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 46.34	$ 46.86	$ 49.42	$ 28.47	$ 999,999.	$ 28.86	$ 999,999.	$ 5.98
Auxiliary Energy Required Heating [GJ/yr]	32.3	31.9	36.7	36.4	37.7	38.5	35.6	38.1	35.3	43.3
Annual Energy DHW [GJ/yr]	26.6	26.6	16.5	16.5	16.5	14.9	23.6	14.9	23.6	9.1
Annual Energy Space Heating [GJ/yr]	32.3	31.9	36.7	36.4	37.7	38.5	35.6	38.1	35.3	43.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	85.2	84.8	79.4	79.1	80.4	79.6	85.4	79.3	85.1	78.7
Design Heating Load [W]	6558.1	6505.1	6632.9	6579.9	6579.9	6662.3	7070.9	6609.4	7017.9	6662.3
Annual Energy Electricity [kWh/yr]	16251.6	16166.4	17479.2	17391.3	17760.3	17972.1	17169.3	17883.6	17083.4	21865.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,236.29	$ 2,224.23	$ 2,409.99	$ 2,397.55	$ 2,449.77	$ 2,479.74	$ 2,366.14	$ 2,467.21	$ 2,353.99	$ 3,030.65
Annual Energy Natural Gas [m3/yr]	715.5	715.5	442.6	442.6	442.6	400.7	633.8	400.7	633.8	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 308.64	$ 308.64	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 273.4	$ 172.85	$ 273.4	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	49897	50167	46663	46933	46879	48285	46661	48555	46931	48289
Upgrade Package List	Pkg2200101031	Pkg2200102031	Pkg1200101031	Pkg1200102031	Pkg1200102021	Pkg2100101031	Pkg1200101031	Pkg2100102031	Pkg1200102031	Pkg2100101031
GHGI [kg/m2]	22.22	22.21	14.92	14.9	14.96	13.84	20.12	13.83	20.11	3.45
% ICC	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	180	180	180	180	180	180	180	180	180	180
Target MEUI cooling [kWh/(m2 * yr)]	208	208	208	208	208	208	208	208	208	208
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	128.6	127.3	146.2	144.9	150.2	153.2	141.7	152	140.5	172.7
Output: MEUI [kWh/(m2 * yr)]	237.2	236	214.3	213.1	218.4	215.2	238.3	213.9	237.1	211.6
Output: Better than ERS (%)	2040.0%	2080.0%	2120.0%	2140.0%	2020.0%	2100.0%	2030.0%	2130.0%	2050.0%	2070.0%
Output: Better than Envelope (%)	4020.0%	4090.0%	3200.0%	3260.0%	3020.0%	2870.0%	3410.0%	2940.0%	3460.0%	1980.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11080	11165	9852	9940	9571	9359	10162	9448	10248	5466
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,562.24	$ 1,574.25	$ 1,389.15	$ 1,401.54	$ 1,349.51	$ 1,319.65	$ 1,432.84	$ 1,332.13	$ 1,444.95	$ 770.68
Annual savings in carbon tax for electricity [$/year]	$ 5.54	$ 5.58	$ 4.93	$ 4.97	$ 4.79	$ 4.68	$ 5.08	$ 4.72	$ 5.12	$ 2.73
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,567.78	$ 1,579.83	$ 1,394.07	$ 1,406.51	$ 1,354.3	$ 1,324.33	$ 1,437.92	$ 1,336.85	$ 1,450.08	$ 773.41
Annual savings in GHG from electricity savings [kg CO2e/year]	121.9	122.8	108.4	109.3	105.3	103	111.8	103.9	112.7	60.1
Annual savings in natural gas [m3/year]	10.18	10.18	0.01	0.01	0.01	1.55	7.13	1.55	7.13	16.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 94.28	$ 94.28	$ .07	$ .07	$ .07	$ 14.4	$ 66.07	$ 14.4	$ 66.07	$ 152.72
Annual savings in carbon tax for natural gas [$/year]	$ 23.53	$ 23.53	$ .02	$ .02	$ .02	$ 3.59	$ 16.49	$ 3.59	$ 16.49	$ 38.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 117.81	$ 117.81	$ .09	$ .09	$ .09	$ 17.99	$ 82.56	$ 17.99	$ 82.56	$ 190.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	522.9	522.9	0.4	0.4	0.4	79.8	366.5	79.8	366.5	847.1
Net Present Value [$]	$ 21,331.36	$ 21,453.15	$ 20,356.97	$ 20,485.69	$ 19,454.7	$ 19,240.15	$ 19,303.22	$ 19,370.52	$ 19,426.83	$ 12,349.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	9.99	9.99	8.6	8.6	9.99	9.99	8.6
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	3.87	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

LANEWAY Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,428.09	$ 5,525.59	$ 5,779.13	$ 5,778.09	$ 5,876.63	$ 5,860.13	$ 5,875.59	$ 5,957.63	$ 5,978.09	$ 6,075.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 8,152.99	$ 8,299.44	$ 8,680.25	$ 8,678.69	$ 8,826.7	$ 8,801.92	$ 8,825.14	$ 8,948.36	$ 8,979.09	$ 9,125.54
Net Present Value [$]	$ 12,349.06	$ 12,484.54	$ 13,327.42	$ 11,537.85	$ 13,461.62	$ 12,183.78	$ 11,673.15	$ 12,322.54	$ 12,734.26	$ 12,869.37
Incremental dollars per GHG saving	$ 5.98	$ 6.08	$ 6.33	$ 6.38	$ 6.43	$ 6.45	$ 6.48	$ 6.55	$ 6.56	$ 6.66
Auxiliary Energy Required Heating [GJ/yr]	43.3	43	41.5	45.3	41.2	43	45	42.6	42.8	42.5
Annual Energy DHW [GJ/yr]	9.1	9.1	9.1	7.8	9.1	9.1	7.8	9.1	8.3	8.3
Annual Energy Space Heating [GJ/yr]	43.3	43	41.5	45.3	41.2	43	45	42.6	42.8	42.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	78.7	78.4	76.9	79.4	76.5	78.3	79	78	77.4	77.1
Design Heating Load [W]	6662.3	6609.4	6632.9	7089	6579.9	6632.9	7036	6579.9	6662.3	6609.4
Annual Energy Electricity [kWh/yr]	21865.5	21775	21349.1	22044.6	21259.1	21761.9	21954.2	21670.1	21502.2	21411.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,030.65	$ 3,017.85	$ 2,957.58	$ 3,056.	$ 2,944.85	$ 3,015.99	$ 3,043.2	$ 3,003.	$ 2,979.25	$ 2,966.47
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	48289	48559	46669	45053	46939	46615	45323	46885	48291	48561
Upgrade Package List	Pkg2100101031	Pkg2100102031	Pkg1200101031	Pkg1100101031	Pkg1200102031	Pkg1200101021	Pkg1100102031	Pkg1200102021	Pkg2100101031	Pkg2100102031
GHGI [kg/m2]	3.45	3.44	3.37	3.48	3.36	3.43	3.46	3.42	3.39	3.38
% ICC	2.7%	2.8%	2.9%	2.9%	3.0%	2.9%	3.0%	3.0%	3.0%	3.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	180	180	180	180	180	180	180	180	180	180
Target MEUI cooling [kWh/(m2 * yr)]	208	208	208	208	208	208	208	208	208	208
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	172.7	171.4	165.3	180.5	164	171.2	179.2	169.9	170.6	169.3
Output: MEUI [kWh/(m2 * yr)]	211.6	210.3	204.2	214.2	202.9	210.1	212.9	208.8	206.4	205.1
Output: Better than ERS (%)	2070.0%	2100.0%	2260.0%	2000.0%	2300.0%	2110.0%	2040.0%	2150.0%	2210.0%	2240.0%
Output: Better than Envelope (%)	1980.0%	2040.0%	2310.0%	1610.0%	2370.0%	2040.0%	1670.0%	2110.0%	2070.0%	2130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5466	5556	5982	5287	6072	5569	5377	5661	5829	5919
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 770.68	$ 783.44	$ 843.49	$ 745.42	$ 856.18	$ 785.29	$ 758.17	$ 798.23	$ 821.9	$ 834.64
Annual savings in carbon tax for electricity [$/year]	$ 2.73	$ 2.78	$ 2.99	$ 2.64	$ 3.04	$ 2.78	$ 2.69	$ 2.83	$ 2.91	$ 2.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 773.41	$ 786.22	$ 846.48	$ 748.07	$ 859.22	$ 788.07	$ 760.86	$ 801.06	$ 824.82	$ 837.6
Annual savings in GHG from electricity savings [kg CO2e/year]	60.1	61.1	65.8	58.2	66.8	61.3	59.1	62.3	64.1	65.1
Annual savings in natural gas [m3/year]	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72
Annual savings in carbon tax for natural gas [$/year]	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1
Net Present Value [$]	$ 12,349.06	$ 12,484.54	$ 13,327.42	$ 11,537.85	$ 13,461.62	$ 12,183.78	$ 11,673.15	$ 12,322.54	$ 12,734.26	$ 12,869.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	8.6	8.6	9.99	8.6	9.99	9.99	8.6	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	5.28	5.28	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	NA	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$.	$.	$ 850.	$.	$ 550.	$ 550.

LANEWAY Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,252.63	$ 8,155.13	$ 8,802.63	$ 8,705.13	$ 7,901.59	$ 7,804.09	$ 9,102.63	$ 9,005.13	$ 8,333.63	$ 8,236.13
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,395.45	$ 12,249.01	$ 13,221.55	$ 13,075.11	$ 11,868.19	$ 11,721.74	$ 13,672.15	$ 13,525.71	$ 12,517.11	$ 12,370.67
Net Present Value [$]	$ 24,839.2	$ 24,814.74	$ 24,633.92	$ 24,609.27	$ 24,598.3	$ 24,565.8	$ 24,562.42	$ 24,537.59	$ 24,470.08	$ 24,440.87
Incremental dollars per GHG saving	$ 58.53	$ 58.04	$ 39.8	$ 39.44	$ 57.05	$ 56.59	$ 33.16	$ 32.88	$ 59.61	$ 59.17
Auxiliary Energy Required Heating [GJ/yr]	36.4	36.7	36.4	36.7	38.1	38.4	36.4	36.7	37.7	38
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	14.9	16.5	16.5	13.9	13.9	16.5	16.5
Annual Energy Space Heating [GJ/yr]	24.9	25	24.9	25.1	25.7	25.9	24.9	25.1	25.4	25.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	68.6	68.8	67	67.2	69.4	69.6	66	66.2	69	69.2
Design Heating Load [W]	6656.3	6709.3	6656.3	6709.3	6665.8	6718.7	6656.3	6709.3	6656.3	6709.3
Annual Energy Electricity [kWh/yr]	14476.7	14524.1	14479.2	14526.6	14706.6	14757.1	14480.8	14528.3	14588.6	14637.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,985.14	$ 1,991.85	$ 1,985.49	$ 1,992.2	$ 2,017.67	$ 2,024.81	$ 1,985.72	$ 1,992.44	$ 2,000.97	$ 2,007.93
Annual Energy Natural Gas [m3/yr]	442.6	442.6	400.7	400.7	442.6	442.6	372.9	372.9	442.6	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 172.85	$ 172.85	$ 190.92	$ 190.92	$ 160.86	$ 160.86	$ 190.92	$ 190.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	46934	46664	46936	46666	48554	48284	46938	46668	46880	46610
Upgrade Package List	Pkg1200102031	Pkg1200101031	Pkg1200102031	Pkg1200101031	Pkg2100102031	Pkg2100101031	Pkg1200102031	Pkg1200101031	Pkg1200102021	Pkg1200101021
GHGI [kg/m2]	14.44	14.45	13.29	13.3	14.48	14.49	12.53	12.54	14.46	14.47
% ICC	4.2%	4.1%	4.4%	4.4%	4.0%	3.9%	4.6%	4.5%	4.2%	4.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	180	180	180	180	180	180	180	180	180	180
Target MEUI cooling [kWh/(m2 * yr)]	208	208	208	208	208	208	208	208	208	208
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	144.9	146.2	145	146.2	151.9	153.2	145	146.3	150.2	151.5
Output: MEUI [kWh/(m2 * yr)]	170.6	171.3	164.4	165.1	173.9	174.6	160.3	161	172.4	173.1
Output: Better than ERS (%)	3330.0%	3310.0%	3490.0%	3470.0%	3260.0%	3240.0%	3590.0%	3570.0%	3290.0%	3280.0%
Output: Better than Envelope (%)	3260.0%	3200.0%	3260.0%	3200.0%	2940.0%	2890.0%	3260.0%	3200.0%	3020.0%	2960.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12855	12807	12852	12805	12625	12574	12850	12803	12743	12694
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,812.5	$ 1,805.82	$ 1,812.15	$ 1,805.46	$ 1,780.08	$ 1,772.96	$ 1,811.92	$ 1,805.22	$ 1,796.72	$ 1,789.78
Annual savings in carbon tax for electricity [$/year]	$ 6.43	$ 6.4	$ 6.43	$ 6.4	$ 6.31	$ 6.29	$ 6.43	$ 6.4	$ 6.37	$ 6.35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,818.93	$ 1,812.22	$ 1,818.57	$ 1,811.87	$ 1,786.4	$ 1,779.25	$ 1,818.35	$ 1,811.62	$ 1,803.09	$ 1,796.13
Annual savings in GHG from electricity savings [kg CO2e/year]	141.4	140.9	141.4	140.9	138.9	138.3	141.4	140.8	140.2	139.6
Annual savings in natural gas [m3/year]	0.01	0.01	1.55	1.55	0.01	0.01	2.59	2.59	0.01	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ 14.4	$ 14.4	$ .07	$ .07	$ 23.99	$ 23.99	$ .07	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ 3.59	$ 3.59	$ .02	$ .02	$ 5.99	$ 5.99	$ .02	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ 17.99	$ 17.99	$ .09	$ .09	$ 29.98	$ 29.98	$ .09	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	79.8	79.8	0.4	0.4	133.1	133.1	0.4	0.4
Net Present Value [$]	$ 24,839.2	$ 24,814.74	$ 24,633.92	$ 24,609.27	$ 24,598.3	$ 24,565.8	$ 24,562.42	$ 24,537.59	$ 24,470.08	$ 24,440.87
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$.	$.

LANEWAY Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,451.59	$ 8,654.09	$ 8,655.13	$ 8,675.59	$ 8,735.09	$ 8,736.13	$ 8,751.59	$ 8,752.63	$ 8,832.59	$ 8,833.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,694.29	$ 12,998.44	$ 13,000.01	$ 13,030.74	$ 13,120.11	$ 13,121.67	$ 13,144.89	$ 13,146.45	$ 13,266.55	$ 13,268.11
Net Present Value [$]	$ 24,393.02	$ 24,288.84	$ 25,701.29	$ 19,470.56	$ 23,953.49	$ 25,331.07	$ 24,321.52	$ 25,721.19	$ 23,974.67	$ 25,365.22
Incremental dollars per GHG saving	$ 38.66	$ 31.89	$ 59.12	$ 9.12	$ 32.32	$ 60.17	$ 32.19	$ 59.58	$ 32.62	$ 60.63
Auxiliary Energy Required Heating [GJ/yr]	38.1	38.5	33.9	43	39.8	35.2	38.1	33.6	39.5	34.9
Annual Energy DHW [GJ/yr]	14.9	13.9	16.5	9.1	13.9	16.5	13.9	16.5	13.9	16.5
Annual Energy Space Heating [GJ/yr]	25.7	25.9	23.1	28.1	26.5	23.7	25.7	22.9	26.4	23.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	67.9	67	66.8	64.2	67.4	67.2	66.8	66.7	67.2	67
Design Heating Load [W]	6665.8	6718.7	6262.6	6665.8	6718.7	6262.6	6665.8	6209.7	6665.8	6209.7
Annual Energy Electricity [kWh/yr]	14709.1	14761.3	13985.5	17837.8	14860.1	14097.8	14710.7	13939.9	14814	14046.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,018.02	$ 2,025.41	$ 1,915.63	$ 2,460.73	$ 2,039.39	$ 1,931.52	$ 2,018.25	$ 1,909.18	$ 2,032.87	$ 1,924.29
Annual Energy Natural Gas [m3/yr]	400.7	372.9	442.6	0	372.9	442.6	372.9	442.6	372.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 172.85	$ 160.86	$ 190.92	$.	$ 160.86	$ 190.92	$ 160.86	$ 190.92	$ 160.86	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	48556	48288	49904	48560	48234	49850	48558	50174	48504	50120
Upgrade Package List	Pkg2100102031	Pkg2100101031	Pkg2200101031	Pkg2100102031	Pkg2100101021	Pkg2200101021	Pkg2100102031	Pkg2200102031	Pkg2100102021	Pkg2200102021
GHGI [kg/m2]	13.33	12.57	14.37	2.82	12.59	14.38	12.57	14.36	12.58	14.38
% ICC	4.3%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	168	168	168	168	168	168	168	168	168	168
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	152	153.3	135.1	171.4	158.8	140.3	152	133.9	157.5	139
Output: MEUI [kWh/(m2 * yr)]	167.7	164.4	163.6	153.3	166	165.4	163.6	162.9	165.3	164.7
Output: Better than ERS (%)	3400.0%	3490.0%	3510.0%	3670.0%	3450.0%	3470.0%	3510.0%	3520.0%	3470.0%	3490.0%
Output: Better than Envelope (%)	2940.0%	2870.0%	3720.0%	2040.0%	2630.0%	3480.0%	2940.0%	3780.0%	2690.0%	3540.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12622	12570	13346	9494	12471	13234	12621	13391	12517	13285
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,779.73	$ 1,772.37	$ 1,881.76	$ 1,338.58	$ 1,758.44	$ 1,865.92	$ 1,779.5	$ 1,888.19	$ 1,764.94	$ 1,873.13
Annual savings in carbon tax for electricity [$/year]	$ 6.31	$ 6.28	$ 6.67	$ 4.75	$ 6.24	$ 6.62	$ 6.31	$ 6.7	$ 6.26	$ 6.64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,786.04	$ 1,778.65	$ 1,888.43	$ 1,343.33	$ 1,764.67	$ 1,872.54	$ 1,785.81	$ 1,894.88	$ 1,771.2	$ 1,879.77
Annual savings in GHG from electricity savings [kg CO2e/year]	138.8	138.3	146.8	104.4	137.2	145.6	138.8	147.3	137.7	146.1
Annual savings in natural gas [m3/year]	1.55	2.59	0.01	16.48	2.59	0.01	2.59	0.01	2.59	0.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 14.4	$ 23.99	$ .07	$ 152.72	$ 23.99	$ .07	$ 23.99	$ .07	$ 23.99	$ .07
Annual savings in carbon tax for natural gas [$/year]	$ 3.59	$ 5.99	$ .02	$ 38.12	$ 5.99	$ .02	$ 5.99	$ .02	$ 5.99	$ .02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 17.99	$ 29.98	$ .09	$ 190.84	$ 29.98	$ .09	$ 29.98	$ .09	$ 29.98	$ .09
Annual savings in GHG from natural gas savings [kg CO2e/year]	79.8	133.1	0.4	847.1	133.1	0.4	133.1	0.4	133.1	0.4
Net Present Value [$]	$ 24,393.02	$ 24,288.84	$ 25,701.29	$ 19,470.56	$ 23,953.49	$ 25,331.07	$ 24,321.52	$ 25,721.19	$ 23,974.67	$ 25,365.22
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	8.6	9.99	8.6	8.6	9.99	9.99	9.99	9.99
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	3.87	5.28	3.87	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55	NA	DWHR eff 55	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$.	$.	$ 850.	$.	$ 850.	$.	$ 850.	$.

LANEWAY Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,675.59	$ 9,128.09	$ 9,225.59	$ 9,429.13	$ 9,428.09	$ 9,526.63	$ 9,510.13	$ 9,451.87	$ 9,525.59	$ 9,607.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,030.74	$ 13,710.39	$ 13,856.84	$ 14,162.55	$ 14,160.99	$ 14,309.	$ 14,284.22	$ 14,196.71	$ 14,307.44	$ 14,430.66
Net Present Value [$]	$ 19,470.56	$ 19,623.33	$ 19,657.11	$ 20,631.79	$ 19,814.12	$ 20,631.06	$ 20,154.03	$ 18,638.23	$ 19,838.59	$ 20,175.4
Incremental dollars per GHG saving	$ 9.12	$ 9.57	$ 9.66	$ 9.83	$ 9.86	$ 9.92	$ 9.93	$ 9.94	$ 9.96	$ 10.02
Auxiliary Energy Required Heating [GJ/yr]	43	42.8	42.5	38.7	42.5	38.3	40.1	43.1	42.1	39.8
Annual Energy DHW [GJ/yr]	9.1	8.3	8.3	9.1	7.8	9.1	9.1	9.1	7.8	9.1
Annual Energy Space Heating [GJ/yr]	28.1	28	27.8	25.4	27.9	25.3	26.2	28.2	27.7	26
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	64.2	63.4	63.2	61.5	62.7	61.4	62.1	64.3	62.5	61.9
Design Heating Load [W]	6665.8	6718.7	6665.8	6262.6	6718.7	6209.7	6262.6	6709.8	6665.8	6209.7
Annual Energy Electricity [kWh/yr]	17837.8	17602.7	17551.7	17094.1	17412.1	17056.5	17248.2	17859.6	17364.7	17202
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,460.73	$ 2,427.47	$ 2,420.25	$ 2,355.5	$ 2,400.5	$ 2,350.18	$ 2,377.31	$ 2,463.82	$ 2,393.79	$ 2,370.77
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	48560	48292	48562	49910	48294	50180	49856	49370	48564	50126
Upgrade Package List	Pkg2100102031	Pkg2100101031	Pkg2100102031	Pkg2200101031	Pkg2100101031	Pkg2200102031	Pkg2200101021	Pkg2100301031	Pkg2100102031	Pkg2200102021
GHGI [kg/m2]	2.82	2.78	2.77	2.7	2.75	2.69	2.72	2.82	2.74	2.71
% ICC	4.4%	4.6%	4.6%	4.7%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	168	168	168	168	168	168	168	168	168	168
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	171.4	170.6	169.3	154.1	169.2	152.8	159.9	171.6	168	158.6
Output: MEUI [kWh/(m2 * yr)]	153.3	150	149.2	142.7	147.2	142.1	145	153.7	146.5	144.4
Output: Better than ERS (%)	3670.0%	3750.0%	3770.0%	3940.0%	3820.0%	3950.0%	3880.0%	3670.0%	3840.0%	3900.0%
Output: Better than Envelope (%)	2040.0%	2070.0%	2130.0%	2830.0%	2130.0%	2910.0%	2570.0%	2020.0%	2200.0%	2630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9494	9729	9780	10237	9919	10275	10083	9472	9967	10129
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,338.58	$ 1,371.73	$ 1,378.92	$ 1,443.45	$ 1,398.61	$ 1,448.75	$ 1,421.72	$ 1,335.51	$ 1,405.29	$ 1,428.23
Annual savings in carbon tax for electricity [$/year]	$ 4.75	$ 4.86	$ 4.89	$ 5.12	$ 4.96	$ 5.14	$ 5.04	$ 4.74	$ 4.98	$ 5.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,343.33	$ 1,376.6	$ 1,383.81	$ 1,448.56	$ 1,403.57	$ 1,453.88	$ 1,426.76	$ 1,340.25	$ 1,410.27	$ 1,433.3
Annual savings in GHG from electricity savings [kg CO2e/year]	104.4	107	107.6	112.6	109.1	113	110.9	104.2	109.6	111.4
Annual savings in natural gas [m3/year]	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72
Annual savings in carbon tax for natural gas [$/year]	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1
Net Present Value [$]	$ 19,470.56	$ 19,623.33	$ 19,657.11	$ 20,631.79	$ 19,814.12	$ 20,631.06	$ 20,154.03	$ 18,638.23	$ 19,838.59	$ 20,175.4
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	8.6	9.99	8.6	8.6	9.99	9.99
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 836.99	$ 836.99	$ 917.99
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	5.28	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 1,832.1	$ 1,832.1	$ 1,832.1	$ 2,683.14	$ 1,832.1	$ 2,683.14	$ 2,683.14	$ 1,832.1	$ 1,832.1	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	BC EffR14	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 873.78	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 550.	$.	$ 850.	$.	$.	$.	$ 850.	$.

LANEWAY Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 8,752.63	$ 8,655.13	$ 9,302.63	$ 9,205.13	$ 9,602.63	$ 9,505.13	$ 8,833.63	$ 8,736.13	$ 9,383.63	$ 9,286.13
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,146.45	$ 13,000.01	$ 13,972.55	$ 13,826.11	$ 14,423.15	$ 14,276.71	$ 13,268.11	$ 13,121.67	$ 14,094.21	$ 13,947.77
Net Present Value [$]	$ 25,721.19	$ 25,701.29	$ 25,515.72	$ 25,496.	$ 25,444.4	$ 25,424.5	$ 25,365.22	$ 25,331.07	$ 25,159.93	$ 25,125.79
Incremental dollars per GHG saving	$ 59.58	$ 59.12	$ 40.96	$ 40.62	$ 34.25	$ 33.96	$ 60.63	$ 60.17	$ 41.54	$ 41.22
Auxiliary Energy Required Heating [GJ/yr]	33.6	33.9	33.6	33.9	33.6	33.9	34.9	35.2	34.9	35.2
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	14.9	13.9	13.9	16.5	16.5	14.9	14.9
Annual Energy Space Heating [GJ/yr]	22.9	23.1	22.9	23.1	23	23.1	23.5	23.7	23.5	23.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Energy [GJ/yr]	66.7	66.8	65.1	65.3	64.1	64.2	67	67.2	65.5	65.7
Design Heating Load [W]	6209.7	6262.6	6209.7	6262.6	6209.7	6262.6	6209.7	6262.6	6209.7	6262.6
Annual Energy Electricity [kWh/yr]	13939.9	13985.5	13942.4	13988	13944	13989.6	14046.7	14097.8	14049.2	14100.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,909.18	$ 1,915.63	$ 1,909.53	$ 1,915.99	$ 1,909.76	$ 1,916.21	$ 1,924.29	$ 1,931.52	$ 1,924.65	$ 1,931.88
Annual Energy Natural Gas [m3/yr]	442.6	442.6	400.7	400.7	372.9	372.9	442.6	442.6	400.7	400.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 172.85	$ 172.85	$ 160.86	$ 160.86	$ 190.92	$ 190.92	$ 172.85	$ 172.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	50174	49904	50176	49906	50178	49908	50120	49850	50122	49852
Upgrade Package List	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102031	Pkg2200101031	Pkg2200102021	Pkg2200101021	Pkg2200102021	Pkg2200101021
GHGI [kg/m2]	14.36	14.37	13.21	13.22	12.44	12.45	14.38	14.38	13.22	13.23
% ICC	4.4%	4.4%	4.7%	4.6%	4.8%	4.8%	4.4%	4.4%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	168	168	168	168	168	168	168	168	168	168
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	133.9	135.1	134	135.2	134	135.3	139	140.3	139.1	140.4
Output: MEUI [kWh/(m2 * yr)]	162.9	163.6	156.7	157.4	152.6	153.3	164.7	165.4	158.5	159.2
Output: Better than ERS (%)	3520.0%	3510.0%	3670.0%	3650.0%	3770.0%	3760.0%	3490.0%	3470.0%	3630.0%	3620.0%
Output: Better than Envelope (%)	3780.0%	3720.0%	3780.0%	3720.0%	3780.0%	3720.0%	3540.0%	3480.0%	3540.0%	3480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13391	13346	13389	13343	13387	13342	13285	13234	13282	13231
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,888.19	$ 1,881.76	$ 1,887.83	$ 1,881.41	$ 1,887.61	$ 1,881.18	$ 1,873.13	$ 1,865.92	$ 1,872.78	$ 1,865.57
Annual savings in carbon tax for electricity [$/year]	$ 6.7	$ 6.67	$ 6.69	$ 6.67	$ 6.69	$ 6.67	$ 6.64	$ 6.62	$ 6.64	$ 6.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,894.88	$ 1,888.43	$ 1,894.53	$ 1,888.08	$ 1,894.3	$ 1,887.85	$ 1,879.77	$ 1,872.54	$ 1,879.42	$ 1,872.19
Annual savings in GHG from electricity savings [kg CO2e/year]	147.3	146.8	147.3	146.8	147.3	146.8	146.1	145.6	146.1	145.5
Annual savings in natural gas [m3/year]	0.01	0.01	1.55	1.55	2.59	2.59	0.01	0.01	1.55	1.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .07	$ .07	$ 14.4	$ 14.4	$ 23.99	$ 23.99	$ .07	$ .07	$ 14.4	$ 14.4
Annual savings in carbon tax for natural gas [$/year]	$ .02	$ .02	$ 3.59	$ 3.59	$ 5.99	$ 5.99	$ .02	$ .02	$ 3.59	$ 3.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .09	$ .09	$ 17.99	$ 17.99	$ 29.98	$ 29.98	$ .09	$ .09	$ 17.99	$ 17.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	0.4	0.4	79.8	79.8	133.1	133.1	0.4	0.4	79.8	79.8
Net Present Value [$]	$ 25,721.19	$ 25,701.29	$ 25,515.72	$ 25,496.	$ 25,444.4	$ 25,424.5	$ 25,365.22	$ 25,331.07	$ 25,159.93	$ 25,125.79
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6	9.99	8.6
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 836.99	$ 917.99	$ 917.99	$ 917.99	$ 917.99
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14	$ 2,683.14
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.	$ 550.

LANEWAY Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 16,669.99	$ 16,767.49	$ 16,812.5	$ 16,865.73	$ 16,879.99	$ 16,901.49	$ 16,939.	$ 16,953.75	$ 16,958.74	$ 16,963.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,038.32	$ 25,184.77	$ 25,252.38	$ 25,332.33	$ 25,353.74	$ 25,386.04	$ 25,442.38	$ 25,464.53	$ 25,472.03	$ 25,478.77
Net Present Value [$]	$ 22,103.97	$ 22,112.37	$ 22,277.8	$ 21,730.39	$ 22,128.04	$ 17,514.27	$ 17,541.21	$ 21,646.21	$ 22,157.3	$ 21,729.3
Incremental dollars per GHG saving	$ 56.26	$ 56.51	$ 68.54	$ 57.08	$ 56.78	$ 17.28	$ 17.31	$ 57.37	$ 69.11	$ 57.33
Auxiliary Energy Required Heating [GJ/yr]	23.7	23.4	22.1	24.7	23	26.9	26.6	23.7	22.2	24.4
Annual Energy DHW [GJ/yr]	13.9	13.9	14.9	13.9	13.9	9.1	9.1	13.9	14.9	13.9
Annual Energy Space Heating [GJ/yr]	16.7	16.6	15.9	17.2	16.4	18.4	18.2	16.9	15.9	17
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	58.9	58.7	59.1	59.1	58.5	55.4	55.4	59.1	59.1	59
Design Heating Load [W]	4076.1	4023.1	3944.1	4076.1	4035.5	3982.5	3997.1	4149.5	3951.3	4023.1
Annual Energy Electricity [kWh/yr]	12496.3	12455.2	12283.1	12565.4	12405.4	15402.5	15377.5	12563.9	12273.1	12528
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,704.91	$ 1,699.1	$ 1,674.74	$ 1,714.69	$ 1,692.05	$ 2,116.14	$ 2,112.6	$ 1,714.48	$ 1,673.33	$ 1,709.4
Annual Energy Natural Gas [m3/yr]	372.9	372.9	400.7	372.9	372.9	0	0	372.9	400.7	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 160.86	$ 160.86	$ 172.85	$ 160.86	$ 160.86	$.	$.	$ 160.86	$ 172.85	$ 160.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	56946	57162	58456	56892	57594	57812	58244	58656	58024	57108
Upgrade Package List	Pkg3300201053	Pkg3300202053	Pkg3300402053	Pkg3300201043	Pkg3300301053	Pkg3300302053	Pkg3300401053	Pkg3300403052	Pkg3300303053	Pkg3300202043
GHGI [kg/m2]	12.22	12.21	12.95	12.23	12.2	2.43	2.43	12.23	12.94	12.22
% ICC	8.4%	8.4%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	133	133	133	133	133	133	133	133	133	133
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	94.3	93.1	88.2	98.5	91.8	107.2	105.9	94.4	88.4	97.2
Output: MEUI [kWh/(m2 * yr)]	131.8	131.2	132.8	133	130.5	118.4	117.9	132.7	132.7	132.5
Output: Better than ERS (%)	4280.0%	4300.0%	4260.0%	4260.0%	4310.0%	4540.0%	4540.0%	4260.0%	4260.0%	4270.0%
Output: Better than Envelope (%)	5610.0%	5670.0%	5910.0%	5430.0%	5740.0%	5020.0%	5070.0%	5610.0%	5890.0%	5480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14835	14876	15048	14766	14926	11929	11954	14767	15058	14803
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,091.73	$ 2,097.53	$ 2,121.8	$ 2,081.99	$ 2,104.55	$ 1,681.96	$ 1,685.49	$ 2,082.2	$ 2,123.21	$ 2,087.27
Annual savings in carbon tax for electricity [$/year]	$ 7.42	$ 7.44	$ 7.52	$ 7.38	$ 7.46	$ 5.96	$ 5.98	$ 7.38	$ 7.53	$ 7.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,099.15	$ 2,104.97	$ 2,129.32	$ 2,089.37	$ 2,112.01	$ 1,687.93	$ 1,691.46	$ 2,089.59	$ 2,130.74	$ 2,094.67
Annual savings in GHG from electricity savings [kg CO2e/year]	163.2	163.6	165.5	162.4	164.2	131.2	131.5	162.4	165.6	162.8
Annual savings in natural gas [m3/year]	2.59	2.59	1.55	2.59	2.59	16.48	16.48	2.59	1.55	2.59
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 23.99	$ 23.99	$ 14.4	$ 23.99	$ 23.99	$ 152.72	$ 152.72	$ 23.99	$ 14.4	$ 23.99
Annual savings in carbon tax for natural gas [$/year]	$ 5.99	$ 5.99	$ 3.59	$ 5.99	$ 5.99	$ 38.12	$ 38.12	$ 5.99	$ 3.59	$ 5.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 29.98	$ 29.98	$ 17.99	$ 29.98	$ 29.98	$ 190.84	$ 190.84	$ 29.98	$ 17.99	$ 29.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	133.1	133.1	79.8	133.1	133.1	847.1	847.1	133.1	79.8	133.1
Net Present Value [$]	$ 22,103.97	$ 22,112.37	$ 22,277.8	$ 21,730.39	$ 22,128.04	$ 17,514.27	$ 17,541.21	$ 21,646.21	$ 22,157.3	$ 21,729.3
ECM Details Envelope Components										
Attic Ceiling RSI	8.6	9.99	9.99	8.6	8.6	9.99	8.6	14.09	14.09	9.99
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 135.	$ 232.5	$ 232.5	$ 135.	$ 135.	$ 232.5	$ 135.	$ 513.75	$ 513.75	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,666.45	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,666.45
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 663.78	$ 663.78	$ 1,008.79	$ 663.78	$ 873.78	$ 873.78	$ 1,008.79	$ 1,008.79	$ 873.78	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$ 850.	$ 550.	$ 850.

LANEWAY Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 16,901.49	$ 16,939.	$ 16,972.74	$ 17,036.5	$ 17,182.74	$ 17,191.49	$ 17,317.75	$ 17,303.99	$ 17,353.99	$ 17,401.49
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,386.04	$ 25,442.38	$ 25,493.06	$ 25,588.82	$ 25,808.48	$ 25,821.62	$ 26,011.26	$ 25,990.59	$ 26,065.69	$ 26,137.04
Net Present Value [$]	$ 17,514.27	$ 17,541.21	$ 17,402.3	$ 17,562.75	$ 17,446.28	$ 17,218.79	$ 17,555.93	$ 17,226.43	$ 17,649.51	$ 17,250.35
Incremental dollars per GHG saving	$ 17.28	$ 17.31	$ 17.35	$ 17.4	$ 17.55	$ 17.57	$ 17.67	$ 17.68	$ 17.69	$ 17.77
Auxiliary Energy Required Heating [GJ/yr]	26.9	26.6	27	26.3	26.3	26.8	25.7	26.4	26.8	26.1
Annual Energy DHW [GJ/yr]	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	8.3	9.1
Annual Energy Space Heating [GJ/yr]	18.4	18.2	18.4	18	18.1	18.4	17.7	18.2	18.3	18
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	55.4	55.4	55.5	55.2	55.2	55.5	54.8	55.3	54.6	55.1
Design Heating Load [W]	3982.5	3997.1	3991.9	3944.1	3951.3	3972.4	3913	3984.8	4035.5	3931.8
Annual Energy Electricity [kWh/yr]	15402.5	15377.5	15418.3	15331.2	15319.7	15404.6	15224.6	15358	15174.2	15310.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,116.14	$ 2,112.6	$ 2,118.37	$ 2,106.05	$ 2,104.42	$ 2,116.44	$ 2,090.97	$ 2,109.84	$ 2,083.83	$ 2,103.16
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	57812	58244	57380	58460	58028	57182	58676	57614	57598	57830
Upgrade Package List	Pkg3300302053	Pkg3300401053	Pkg3300203053	Pkg3300402053	Pkg3300303053	Pkg3300202054	Pkg3300403053	Pkg3300301054	Pkg3300301053	Pkg3300302054
GHGI [kg/m2]	2.43	2.43	2.43	2.42	2.42	2.43	2.4	2.42	2.39	2.42
% ICC	8.5%	8.5%	8.5%	8.6%	8.6%	8.6%	8.7%	8.7%	8.7%	8.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	133	133	133	133	133	133	133	133	133	133
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	107.2	105.9	107.8	104.6	105	106.7	102.4	105.2	106.7	104
Output: MEUI [kWh/(m2 * yr)]	118.4	117.9	118.6	117.3	117.2	118.4	115.8	117.7	115.1	117.1
Output: Better than ERS (%)	4540.0%	4540.0%	4530.0%	4560.0%	4560.0%	4530.0%	4600.0%	4550.0%	4620.0%	4570.0%
Output: Better than Envelope (%)	5020.0%	5070.0%	5000.0%	5130.0%	5130.0%	5040.0%	5240.0%	5110.0%	5040.0%	5170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11929	11954	11913	12000	12012	11927	12107	11973	12157	12020
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,681.96	$ 1,685.49	$ 1,679.73	$ 1,692.01	$ 1,693.64	$ 1,681.66	$ 1,707.04	$ 1,688.24	$ 1,714.15	$ 1,694.89
Annual savings in carbon tax for electricity [$/year]	$ 5.96	$ 5.98	$ 5.96	$ 6.	$ 6.01	$ 5.96	$ 6.05	$ 5.99	$ 6.08	$ 6.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,687.93	$ 1,691.46	$ 1,685.69	$ 1,698.01	$ 1,699.64	$ 1,687.63	$ 1,713.1	$ 1,694.22	$ 1,720.23	$ 1,700.9
Annual savings in GHG from electricity savings [kg CO2e/year]	131.2	131.5	131	132	132.1	131.2	133.2	131.7	133.7	132.2
Annual savings in natural gas [m3/year]	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48	16.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72	$ 152.72
Annual savings in carbon tax for natural gas [$/year]	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12	$ 38.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84	$ 190.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1	847.1
Net Present Value [$]	$ 17,514.27	$ 17,541.21	$ 17,402.3	$ 17,562.75	$ 17,446.28	$ 17,218.79	$ 17,555.93	$ 17,226.43	$ 17,649.51	$ 17,250.35
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	14.09	9.99	14.09	9.99	14.09	8.6	8.6	9.99
Attic Ceiling Code	CeilR60	CeilR50	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 513.75	$ 232.5	$ 513.75	$ 232.5	$ 513.75	$ 135.	$ 135.	$ 232.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR10	BC EffR20	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 873.78	$ 1,008.79	$ 663.78	$ 1,008.79	$ 873.78	$ 663.78	$ 1,008.79	$ 873.78	$ 873.78	$ 873.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

LANEWAY Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k	laneway.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 16,812.5	$ 17,015.	$ 17,112.5	$ 17,093.75	$ 16,977.49	$ 16,958.74	$ 17,393.75	$ 16,879.99	$ 16,767.49	$ 16,669.99
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,252.38	$ 25,556.53	$ 25,702.98	$ 25,674.81	$ 25,500.19	$ 25,472.03	$ 26,125.41	$ 25,353.74	$ 25,184.77	$ 25,038.32
Net Present Value [$]	$ 22,277.8	$ 22,208.12	$ 22,206.48	$ 22,205.61	$ 22,168.76	$ 22,157.3	$ 22,134.65	$ 22,128.04	$ 22,112.37	$ 22,103.97
Incremental dollars per GHG saving	$ 68.54	$ 57.06	$ 57.31	$ 69.43	$ 56.99	$ 69.11	$ 58.08	$ 56.78	$ 56.51	$ 56.26
Auxiliary Energy Required Heating [GJ/yr]	22.1	22.4	22.1	21.6	22.7	22.2	21.6	23	23.4	23.7
Annual Energy DHW [GJ/yr]	14.9	13.9	13.9	14.9	13.9	14.9	13.9	13.9	13.9	13.9
Annual Energy Space Heating [GJ/yr]	15.9	16	15.9	15.6	16.2	15.9	15.6	16.4	16.6	16.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	59.1	58.2	58.1	58.9	58.4	59.1	57.8	58.5	58.7	58.9
Design Heating Load [W]	3944.1	3997.1	3944.1	3913	3982.5	3951.3	3913	4035.5	4023.1	4076.1
Annual Energy Electricity [kWh/yr]	12283.1	12321.9	12284.6	12201.9	12351.7	12273.1	12203.3	12405.4	12455.2	12496.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,674.74	$ 1,680.23	$ 1,674.96	$ 1,663.25	$ 1,684.45	$ 1,673.33	$ 1,663.45	$ 1,692.05	$ 1,699.1	$ 1,704.91
Annual Energy Natural Gas [m3/yr]	400.7	372.9	372.9	400.7	372.9	400.7	372.9	372.9	372.9	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 172.85	$ 160.86	$ 160.86	$ 172.85	$ 160.86	$ 172.85	$ 160.86	$ 160.86	$ 160.86	$ 160.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	58456	58242	58458	58672	57810	58024	58674	57594	57162	56946
Upgrade Package List	Pkg3300402053	Pkg3300401053	Pkg3300402053	Pkg3300403053	Pkg3300302053	Pkg3300303053	Pkg3300403053	Pkg3300301053	Pkg3300202053	Pkg3300201053
GHGI [kg/m2]	12.95	12.19	12.18	12.93	12.19	12.94	12.17	12.2	12.21	12.22
% ICC	8.5%	8.6%	8.6%	8.6%	8.5%	8.5%	8.8%	8.5%	8.4%	8.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	133	133	133	133	133	133	133	133	133	133
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	88.2	89.4	88.2	86	90.6	88.4	86.1	91.8	93.1	94.3
Output: MEUI [kWh/(m2 * yr)]	132.8	129.2	128.7	131.6	129.7	132.7	127.5	130.5	131.2	131.8
Output: Better than ERS (%)	4260.0%	4340.0%	4350.0%	4280.0%	4320.0%	4260.0%	4380.0%	4310.0%	4300.0%	4280.0%
Output: Better than Envelope (%)	5910.0%	5850.0%	5910.0%	6000.0%	5800.0%	5890.0%	6000.0%	5740.0%	5670.0%	5610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15048	15009	15047	15129	14980	15058	15128	14926	14876	14835
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,121.8	$ 2,116.33	$ 2,121.58	$ 2,133.25	$ 2,112.12	$ 2,123.21	$ 2,133.05	$ 2,104.55	$ 2,097.53	$ 2,091.73
Annual savings in carbon tax for electricity [$/year]	$ 7.52	$ 7.5	$ 7.52	$ 7.56	$ 7.49	$ 7.53	$ 7.56	$ 7.46	$ 7.44	$ 7.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,129.32	$ 2,123.83	$ 2,129.11	$ 2,140.81	$ 2,119.61	$ 2,130.74	$ 2,140.61	$ 2,112.01	$ 2,104.97	$ 2,099.15
Annual savings in GHG from electricity savings [kg CO2e/year]	165.5	165.1	165.5	166.4	164.8	165.6	166.4	164.2	163.6	163.2
Annual savings in natural gas [m3/year]	1.55	2.59	2.59	1.55	2.59	1.55	2.59	2.59	2.59	2.59
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 14.4	$ 23.99	$ 23.99	$ 14.4	$ 23.99	$ 14.4	$ 23.99	$ 23.99	$ 23.99	$ 23.99
Annual savings in carbon tax for natural gas [$/year]	$ 3.59	$ 5.99	$ 5.99	$ 3.59	$ 5.99	$ 3.59	$ 5.99	$ 5.99	$ 5.99	$ 5.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 17.99	$ 29.98	$ 29.98	$ 17.99	$ 29.98	$ 17.99	$ 29.98	$ 29.98	$ 29.98	$ 29.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	79.8	133.1	133.1	79.8	133.1	79.8	133.1	133.1	133.1	133.1
Net Present Value [$]	$ 22,277.8	$ 22,208.12	$ 22,206.48	$ 22,205.61	$ 22,168.76	$ 22,157.3	$ 22,134.65	$ 22,128.04	$ 22,112.37	$ 22,103.97
ECM Details Envelope Components										
Attic Ceiling RSI	9.99	8.6	9.99	14.09	9.99	14.09	14.09	8.6	9.99	8.6
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 232.5	$ 135.	$ 232.5	$ 513.75	$ 232.5	$ 513.75	$ 513.75	$ 135.	$ 232.5	$ 135.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71	$ 4,470.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5	$ 3,250.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 1,008.79	$ 873.78	$ 873.78	$ 1,008.79	$ 873.78	$ 663.78	$ 663.78
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 4,348.46	$ 4,400.36	$ 4,417.17	$ 4,453.48	$ 4,505.38	$ 4,561.45	$ 4,597.76	$ 4,611.45	$ 4,634.46	$ 4,649.66
ICC with multiplier (Van=1.0,this Cz =1)	$ 4,348.46	$ 4,400.36	$ 4,417.17	$ 4,453.48	$ 4,505.38	$ 4,561.45	$ 4,597.76	$ 4,611.45	$ 4,634.46	$ 4,649.66
Net Present Value [$]	$ 202.45	$ 68.66	$ 84.5	$ 318.89	$ 54.57	$ 140.86	$ 258.76	$ 173.01	$ 16.38	$ 4.1
Incremental dollars per GHG saving	$ 5.15	$ 5.52	$ 5.54	$ 4.99	$ 5.33	$ 5.59	$ 5.05	$ 5.61	$ 5.35	$ 5.38
Auxiliary Energy Required Heating [GJ/yr]	11.9	12.8	12.8	11	11.9	12.5	10.7	13.4	11.5	11.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	12.7	13.6	13.6	11.7	12.6	13.2	11.3	14.2	12.2	12.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	52.3	53.2	53.2	51.3	52.2	52.8	51	52.7	51.8	51.9
Design Heating Load [W]	5094.9	5094.9	4853.8	4847.4	4847.4	4762.9	4756.5	4911.3	5024.6	4756.5
Annual Energy Electricity [kWh/yr]	7324.2	7328.9	7328.9	7319.5	7324	7327	7317.7	7331.8	7322.1	7322.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 973.06	$ 973.72	$ 973.72	$ 972.39	$ 973.03	$ 973.46	$ 972.14	$ 974.13	$ 972.76	$ 972.78
Annual Energy Natural Gas [m3/yr]	695.8	720.5	720.4	670.8	694.8	710.5	661.3	706.9	684.5	685.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 300.14	$ 310.8	$ 310.76	$ 289.36	$ 299.71	$ 306.48	$ 285.26	$ 304.93	$ 295.27	$ 295.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	184	130	11416	1804	1750	13036	3424	3317	454	3370
Upgrade Package List	Pkg1111101031	Pkg1111101021	Pkg2121101011	Pkg1121101031	Pkg1121101021	Pkg2131101011	Pkg1131101031	Pkg1131101011	Pkg1111102031	Pkg1131101021
GHGI [kg/m2]	13.82	14.29	14.29	13.36	13.81	14.1	13.18	14.03	13.61	13.62
% ICC	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	32.5	34.9	34.9	30	32.4	33.9	29.1	36.4	31.4	31.4
Output: MEUI [kWh/(m2 * yr)]	72.5	75	69.9	75	72.3	74	68.9	73.6	71.3	71.3
Output: Better than ERS (%)	1380.0%	1240.0%	1240.0%	1550.0%	1400.0%	1300.0%	1600.0%	1320.0%	1470.0%	1450.0%
Output: Better than Envelope (%)	350.0%	1130.0%	1130.0%	430.0%	350.0%	870.0%	700.0%	1650.0%	0.0%	90.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	340	335	335	344	340	337	346	332	342	342
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 47.9	$ 47.23	$ 47.23	$ 48.56	$ 47.93	$ 47.5	$ 48.81	$ 46.83	$ 48.19	$ 48.18
Annual savings in carbon tax for electricity [$/year]	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 48.07	$ 47.4	$ 47.4	$ 48.73	$ 48.1	$ 47.67	$ 48.99	$ 46.99	$ 48.36	$ 48.35
Annual savings in GHG from electricity savings [kg CO2e/year]	3.7	3.7	3.7	3.8	3.7	3.7	3.8	3.7	3.8	3.8
Annual savings in natural gas [m3/year]	16.35	15.43	15.44	17.28	16.39	15.81	17.64	15.94	16.77	16.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 151.51	$ 142.98	$ 143.02	$ 160.14	$ 151.86	$ 146.44	$ 163.42	$ 147.68	$ 155.41	$ 155.2
Annual savings in carbon tax for natural gas [$/year]	$ 37.82	$ 35.69	$ 35.7	$ 39.97	$ 37.9	$ 36.55	$ 40.79	$ 36.86	$ 38.79	$ 38.74
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 189.33	$ 178.67	$ 178.71	$ 200.11	$ 189.76	$ 182.99	$ 204.21	$ 184.54	$ 194.2	$ 193.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	840.4	793.1	793.3	888.2	842.3	812.2	906.4	819.1	862	860.8
Net Present Value [$]	$ 202.45	$ 68.66	$ 84.5	$ 318.89	$ 54.57	$ 140.86	$ 258.76	$ 173.01	$ 16.38	$ 4.1
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 396.	$ 396.	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 588.21	$.	$ 536.31	$ 588.21	$.	$ 536.31	$.	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$.	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

SMALL Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 6,157.76	$ 6,187.24	$ 6,331.52	$ 9,307.76	$ 9,337.24	$ 6,473.24	$ 6,617.52	$ 6,421.76	$ 9,481.52	$ 6,687.24
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,157.76	$ 6,187.24	$ 6,331.52	$ 9,307.76	$ 9,337.24	$ 6,473.24	$ 6,617.52	$ 6,421.76	$ 9,481.52	$ 6,687.24
Net Present Value [$]	$ 4,332.28	$ 4,359.7	$ 4,415.7	$ 9,876.17	$ 10,057.56	$ 4,541.04	$ 4,596.86	$ 4,232.74	$ 10,118.94	$ 4,634.67
Incremental dollars per GHG saving	$ 4.25	$ 4.27	$ 4.31	$ 4.37	$ 4.39	$ 4.4	$ 4.44	$ 4.45	$ 4.45	$ 4.47
Auxiliary Energy Required Heating [GJ/yr]	13.2	13.2	12.8	13.2	13.2	12.7	12.4	13.3	12.8	12.3
Annual Energy DHW [GJ/yr]	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.1	7.6	7.6
Annual Energy Space Heating [GJ/yr]	14	14	13.6	4.6	4.6	13.5	13.1	14.1	4.4	13
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	47.7	47.7	47.3	41.7	41.9	47.3	46.9	47.3	41.8	46.8
Design Heating Load [W]	4631.8	4746.4	4655.5	4672	4790.2	4676.1	4585.2	4702.1	4699.3	4596.6
Annual Energy Electricity [kWh/yr]	9449	9448.9	9447.1	11576.5	11635.5	9446.7	9444.8	9298.1	11603.3	9444.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,273.72	$ 1,273.7	$ 1,273.45	$ 1,574.76	$ 1,583.11	$ 1,273.39	$ 1,273.12	$ 1,252.37	$ 1,578.55	$ 1,273.03
Annual Energy Natural Gas [m3/yr]	368.1	367.9	357.9	0	0	356.1	346.1	371.1	0	342.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 158.79	$ 158.7	$ 154.39	$.	$.	$ 153.61	$ 149.3	$ 160.08	$.	$ 147.74
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13417	6667	8287	13426	6676	6937	8557	13148	8296	17899
Upgrade Package List	Pkg2131102031	Pkg1221101031	Pkg1231101031	Pkg2131102031	Pkg1221101031	Pkg1221102031	Pkg1231102031	Pkg2131101031	Pkg1231101031	Pkg2221101031
GHGI [kg/m2]	7.91	7.91	7.72	1.25	1.25	7.69	7.5	7.95	1.25	7.43
% ICC	2.7%	2.7%	2.8%	4.1%	4.1%	2.9%	2.9%	2.8%	4.2%	3.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35.8	35.8	34.8	35.8	35.8	34.7	33.7	36.1	34.8	33.3
Output: MEUI [kWh/(m2 * yr)]	60.1	60.1	59	42.1	42.5	58.8	57.8	58.9	42.2	57.4
Output: Better than ERS (%)	2090.0%	2090.0%	2160.0%	3620.0%	3590.0%	2160.0%	2220.0%	2160.0%	3610.0%	2240.0%
Output: Better than Envelope (%)	1480.0%	1480.0%	1130.0%	1480.0%	1480.0%	1040.0%	780.0%	1570.0%	1130.0%	700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1785	1785	1783	3913	3972	1783	1781	1634	3939	1780
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 251.7	$ 251.68	$ 251.43	$ 551.68	$ 560.	$ 251.37	$ 251.11	$ 230.42	$ 555.46	$ 251.01
Annual savings in carbon tax for electricity [$/year]	$ .89	$ .89	$ .89	$ 1.96	$ 1.99	$ .89	$ .89	$ .82	$ 1.97	$ .89
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 252.59	$ 252.58	$ 252.32	$ 553.63	$ 561.98	$ 252.27	$ 252.	$ 231.24	$ 557.43	$ 251.9
Annual savings in GHG from electricity savings [kg CO2e/year]	19.6	19.6	19.6	43	43.7	19.6	19.6	18	43.3	19.6
Annual savings in natural gas [m3/year]	28.56	28.57	28.94	42.28	42.28	29.01	29.38	28.45	42.28	29.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 264.63	$ 264.7	$ 268.15	$ 391.7	$ 391.7	$ 268.78	$ 272.23	$ 263.6	$ 391.7	$ 273.47
Annual savings in carbon tax for natural gas [$/year]	$ 66.05	$ 66.07	$ 66.93	$ 97.77	$ 97.77	$ 67.09	$ 67.95	$ 65.79	$ 97.77	$ 68.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 330.68	$ 330.77	$ 335.08	$ 489.47	$ 489.47	$ 335.86	$ 340.17	$ 329.39	$ 489.47	$ 341.73
Annual savings in GHG from natural gas savings [kg CO2e/year]	1467.8	1468.2	1487.3	2172.6	2172.6	1490.8	1509.9	1462.1	2172.6	1516.8
Net Present Value [$]	$ 4,332.28	$ 4,359.7	$ 4,415.7	$ 9,876.17	$ 10,057.56	$ 4,541.04	$ 4,596.86	$ 4,232.74	$ 10,118.94	$ 4,634.67
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	8.82	8.82	10.61	8.82	10.61	10.61	8.82	8.82	8.82
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 682.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	3.87	5.28	5.28	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	BC ASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$ 3,150.	$ 3,150.	$.	$.	$.	$ 3,150.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 550.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

SMALL Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 4,453.48	$ 4,597.76	$ 4,348.46	$ 4,739.48	$ 4,883.76	$ 4,505.38	$ 4,953.48	$ 4,634.46	$ 5,003.48	$ 4,649.66
ICC with multiplier (Van=1.0,this Cz =1)	$ 4,453.48	$ 4,597.76	$ 4,348.46	$ 4,739.48	$ 4,883.76	$ 4,505.38	$ 4,953.48	$ 4,634.46	$ 5,003.48	$ 4,649.66
Net Present Value [$]	$ 318.89	$ 258.76	$ 202.45	$ 132.45	$ 71.17	$ 54.57	$ 30.94	$ 16.38	$ 11.05	$ 4.1
Incremental dollars per GHG saving	$ 4.99	$ 5.05	$ 5.15	$ 5.19	$ 5.24	$ 5.33	$ 5.28	$ 5.35	$ 5.28	$ 5.38
Auxiliary Energy Required Heating [GJ/yr]	11	10.7	11.9	10.6	10.3	11.9	10.2	11.5	11.1	11.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5
Annual Energy Space Heating [GJ/yr]	11.7	11.3	12.7	11.3	10.9	12.6	10.8	12.2	11.7	12.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	51.3	51	52.3	50.9	50.5	52.2	50.4	51.8	50.3	51.9
Design Heating Load [W]	4847.4	4756.5	5094.9	4777.1	4686.2	4847.4	4699	5024.6	4847.4	4756.5
Annual Energy Electricity [kWh/yr]	7319.5	7317.7	7324.2	7317.3	7315.6	7324	7314.9	7322.1	7319.5	7322.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 972.39	$ 972.14	$ 973.06	$ 972.08	$ 971.84	$ 973.03	$ 971.74	$ 972.76	$ 972.39	$ 972.78
Annual Energy Natural Gas [m3/yr]	670.8	661.3	695.8	659.6	650.2	694.8	646.9	684.5	641.9	685.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 289.36	$ 285.26	$ 300.14	$ 284.53	$ 280.47	$ 299.71	$ 279.05	$ 295.27	$ 276.89	$ 295.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1804	3424	184	2074	3694	1750	11524	454	1805	3370
Upgrade Package List	Pkg1121101031	Pkg1131101031	Pkg1111101031	Pkg1121102031	Pkg1131102031	Pkg1121101021	Pkg2121101031	Pkg1111102031	Pkg1121101031	Pkg1131101021
GHGI [kg/m2]	13.36	13.18	13.82	13.15	12.97	13.81	12.91	13.61	12.81	13.62
% ICC	2.0%	2.0%	1.9%	2.1%	2.2%	2.0%	2.2%	2.1%	2.2%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	30	29.1	32.5	28.9	28	32.4	27.7	31.4	30.1	31.4
Output: MEUI [kWh/(m2 * yr)]	69.9	68.9	72.5	68.7	67.7	72.3	67.4	71.3	67	71.3
Output: Better than ERS (%)	1550.0%	1600.0%	1380.0%	1610.0%	1680.0%	1400.0%	1700.0%	1470.0%	1710.0%	1450.0%
Output: Better than Envelope (%)	430.0%	700.0%	350.0%	780.0%	1040.0%	350.0%	1130.0%	0.0%	350.0%	90.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	344	346	340	347	348	340	349	342	344	342
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 48.56	$ 48.81	$ 47.9	$ 48.87	$ 49.11	$ 47.93	$ 49.21	$ 48.19	$ 48.56	$ 48.18
Annual savings in carbon tax for electricity [$/year]	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 48.73	$ 48.99	$ 48.07	$ 49.04	$ 49.28	$ 48.1	$ 49.38	$ 48.36	$ 48.73	$ 48.35
Annual savings in GHG from electricity savings [kg CO2e/year]	3.8	3.8	3.7	3.8	3.8	3.7	3.8	3.8	3.8	3.8
Annual savings in natural gas [m3/year]	17.28	17.64	16.35	17.7	18.05	16.39	18.17	16.77	18.36	16.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 160.14	$ 163.42	$ 151.51	$ 164.01	$ 167.25	$ 151.86	$ 168.39	$ 155.41	$ 170.12	$ 155.2
Annual savings in carbon tax for natural gas [$/year]	$ 39.97	$ 40.79	$ 37.82	$ 40.94	$ 41.75	$ 37.9	$ 42.03	$ 38.79	$ 42.46	$ 38.74
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 200.11	$ 204.21	$ 189.33	$ 204.94	$ 209.	$ 189.76	$ 210.42	$ 194.2	$ 212.58	$ 193.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	888.2	906.4	840.4	909.7	927.7	842.3	934	862	943.6	860.8
Net Present Value [$]	$ 318.89	$ 258.76	$ 202.45	$ 132.45	$ 71.17	$ 54.57	$ 30.94	$ 16.38	$ 11.05	$ 4.1
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	10.61	8.82	8.82	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$.	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$.	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

SMALL Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,607.52	$ 6,749.24	$ 6,763.24	$ 6,893.52	$ 6,907.52	$ 6,944.22	$ 6,959.42	$ 7,049.24	$ 7,101.14	$ 7,193.52
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,607.52	$ 6,749.24	$ 6,763.24	$ 6,893.52	$ 6,907.52	$ 6,944.22	$ 6,959.42	$ 7,049.24	$ 7,101.14	$ 7,193.52
Net Present Value [$]	$ 920.2	$ 1,047.84	$ 1,000.17	$ 1,113.43	$ 1,065.57	$ 1,296.3	$ 1,308.1	$ 1,192.24	$ 1,434.59	$ 1,258.38
Incremental dollars per GHG saving	$ 6.05	$ 6.16	$ 6.09	$ 6.19	$ 6.12	$ 6.39	$ 6.4	$ 6.23	$ 6.51	$ 6.26
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.3	8.7	8	8.3	9.1	9.1	8.3	9.1	8
Annual Energy DHW [GJ/yr]	12.4	12.4	11.7	12.4	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	8.8	8.8	9.2	8.4	8.8	9.7	9.7	8.8	9.6	8.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	47.4	47.3	47	47	46.7	47.5	47.5	46.6	47.4	46.3
Design Heating Load [W]	4411.7	4432.2	4502.6	4341.3	4411.7	4679.7	4411.7	4432.2	4432.2	4341.3
Annual Energy Electricity [kWh/yr]	7305.1	7304.8	7306.9	7303.2	7305.2	7309.3	7309.3	7304.9	7308.9	7303.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 970.36	$ 970.31	$ 970.61	$ 970.09	$ 970.37	$ 970.95	$ 970.95	$ 970.33	$ 970.89	$ 970.09
Annual Energy Natural Gas [m3/yr]	566	564.4	556.4	555.5	547.5	569.4	569	545.8	567.3	537
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 244.15	$ 243.46	$ 240.01	$ 239.62	$ 236.17	$ 245.62	$ 245.45	$ 235.44	$ 244.71	$ 231.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21029	18167	17898	21299	21030	15036	20976	18168	18114	21300
Upgrade Package List	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2231101031	Pkg2211102031	Pkg2231101021	Pkg2221102031	Pkg2221102021	Pkg2231102031
GHGI [kg/m2]	11.39	11.36	11.21	11.19	11.04	11.45	11.45	11.01	11.41	10.85
% ICC	2.9%	3.0%	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	78	78	78	78	78	78	78	78	78	78
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.7	22.5	23.6	21.6	22.7	24.8	24.8	22.5	24.6	21.7
Output: MEUI [kWh/(m2 * yr)]	59.1	59	58.2	58	57.3	59.5	59.5	57.1	59.3	56.2
Output: Better than ERS (%)	2190.0%	2210.0%	2260.0%	2260.0%	2310.0%	2170.0%	2170.0%	2320.0%	2190.0%	2370.0%
Output: Better than Envelope (%)	2780.0%	2780.0%	2430.0%	3040.0%	2780.0%	2090.0%	2090.0%	2780.0%	2090.0%	3040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	359	359	357	361	359	355	355	359	355	361
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 50.59	$ 50.63	$ 50.34	$ 50.86	$ 50.58	$ 50.	$ 50.	$ 50.62	$ 50.05	$ 50.86
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 50.77	$ 50.81	$ 50.52	$ 51.04	$ 50.76	$ 50.18	$ 50.18	$ 50.8	$ 50.23	$ 51.04
Annual savings in GHG from electricity savings [kg CO2e/year]	3.9	4	3.9	4	3.9	3.9	3.9	3.9	3.9	4
Annual savings in natural gas [m3/year]	21.19	21.25	21.55	21.58	21.88	21.06	21.08	21.94	21.14	22.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 196.32	$ 196.87	$ 199.63	$ 199.94	$ 202.7	$ 195.14	$ 195.28	$ 203.29	$ 195.87	$ 206.33
Annual savings in carbon tax for natural gas [$/year]	$ 49.	$ 49.14	$ 49.83	$ 49.9	$ 50.59	$ 48.71	$ 48.74	$ 50.74	$ 48.89	$ 51.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 245.32	$ 246.01	$ 249.46	$ 249.85	$ 253.3	$ 243.85	$ 244.02	$ 254.03	$ 244.76	$ 257.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	1088.9	1092	1107.3	1109	1124.3	1082.4	1083.1	1127.6	1086.4	1144.4
Net Present Value [$]	$ 920.2	$ 1,047.84	$ 1,000.17	$ 1,113.43	$ 1,065.57	$ 1,296.3	$ 1,308.1	$ 1,192.24	$ 1,434.59	$ 1,258.38
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	8.82	10.61	8.82	10.61	8.82	10.61	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$.	$ 249.3	$ 105.02	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,607.52	$ 6,763.24	$ 6,907.52	$ 6,749.24	$ 6,893.52	$ 9,063.24	$ 7,049.24	$ 7,193.52	$ 9,207.52	$ 9,259.42
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,607.52	$ 6,763.24	$ 6,907.52	$ 6,749.24	$ 6,893.52	$ 9,063.24	$ 7,049.24	$ 7,193.52	$ 9,207.52	$ 9,259.42
Net Present Value [$]	$ 920.2	$ 1,000.17	$ 1,065.57	$ 1,047.84	$ 1,113.43	$ 6,897.04	$ 1,192.24	$ 1,258.38	$ 6,963.72	$ 6,606.82
Incremental dollars per GHG saving	$ 6.05	$ 6.09	$ 6.12	$ 6.16	$ 6.19	$ 6.2	$ 6.23	$ 6.26	$ 6.3	$ 6.33
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.7	8.3	8.3	8	8.7	8.3	8	8.3	9.1
Annual Energy DHW [GJ/yr]	12.4	11.7	11.7	12.4	12.4	13.5	11.7	11.7	13.5	13.5
Annual Energy Space Heating [GJ/yr]	8.8	9.2	8.8	8.8	8.4	3.1	8.8	8.4	3	3.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	47.4	47	46.7	47.3	47	47.1	46.6	46.3	47	46.4
Design Heating Load [W]	4411.7	4502.6	4411.7	4432.2	4341.3	4538.2	4432.2	4341.3	4447.3	4447.3
Annual Energy Electricity [kWh/yr]	7305.1	7306.9	7305.2	7304.8	7303.2	9336.2	7304.9	7303.2	9306	9147.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 970.36	$ 970.61	$ 970.37	$ 970.31	$ 970.09	$ 1,257.76	$ 970.33	$ 970.09	$ 1,253.48	$ 1,231.01
Annual Energy Natural Gas [m3/yr]	566	556.4	547.5	564.4	555.5	362.1	545.8	537	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 244.15	$ 240.01	$ 236.17	$ 243.46	$ 239.62	$ 156.2	$ 235.44	$ 231.64	$ 156.2	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21029	17898	21030	18167	21299	17905	18168	21300	21037	20983
Upgrade Package List	Pkg2231101031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2231101021
GHGI [kg/m2]	11.39	11.21	11.04	11.36	11.19	7.79	11.01	10.85	7.79	7.77
% ICC	2.9%	3.0%	3.1%	3.0%	3.1%	4.0%	3.1%	3.2%	4.1%	4.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	78	78	78	78	78	78	78	78	78	78
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.7	23.6	22.7	22.5	21.6	23.5	22.5	21.7	22.6	24.7
Output: MEUI [kWh/(m2 * yr)]	59.1	58.2	57.3	59	58	56.2	57.1	56.2	55.9	55
Output: Better than ERS (%)	2190.0%	2260.0%	2310.0%	2210.0%	2260.0%	2830.0%	2320.0%	2370.0%	2850.0%	2940.0%
Output: Better than Envelope (%)	2780.0%	2430.0%	2780.0%	2780.0%	3040.0%	2430.0%	2780.0%	3040.0%	2780.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	359	357	359	359	361	1672	359	361	1642	1483
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 50.59	$ 50.34	$ 50.58	$ 50.63	$ 50.86	$ 235.79	$ 50.62	$ 50.86	$ 231.54	$ 209.15
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .84	$ .18	$ .18	$ .82	$ .74
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 50.77	$ 50.52	$ 50.76	$ 50.81	$ 51.04	$ 236.63	$ 50.8	$ 51.04	$ 232.36	$ 209.89
Annual savings in GHG from electricity savings [kg CO2e/year]	3.9	3.9	3.9	4	4	18.4	3.9	4	18.1	16.3
Annual savings in natural gas [m3/year]	21.19	21.55	21.88	21.25	21.58	28.79	21.94	22.27	28.79	28.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 196.32	$ 199.63	$ 202.7	$ 196.87	$ 199.94	$ 266.7	$ 203.29	$ 206.33	$ 266.7	$ 266.7
Annual savings in carbon tax for natural gas [$/year]	$ 49.	$ 49.83	$ 50.59	$ 49.14	$ 49.9	$ 66.57	$ 50.74	$ 51.5	$ 66.57	$ 66.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 245.32	$ 249.46	$ 253.3	$ 246.01	$ 249.85	$ 333.27	$ 254.03	$ 257.83	$ 333.27	$ 333.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	1088.9	1107.3	1124.3	1092	1109	1479.3	1127.6	1144.4	1479.3	1479.3
Net Present Value [$]	$ 920.2	$ 1,000.17	$ 1,065.57	$ 1,047.84	$ 1,113.43	$ 6,897.04	$ 1,192.24	$ 1,258.38	$ 6,963.72	$ 6,606.82
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	10.61	8.82	10.61	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	NBC gas furnace	NBC gas furnace	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$ 3,150.	$.	$.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.	$.

SMALL Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,607.52	$ 6,763.24	$ 6,749.24	$ 6,907.52	$ 6,893.52	$ 7,049.24	$ 7,193.52	$ 6,944.22	$ 6,959.42	$ 7,101.14
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,607.52	$ 6,763.24	$ 6,749.24	$ 6,907.52	$ 6,893.52	$ 7,049.24	$ 7,193.52	$ 6,944.22	$ 6,959.42	$ 7,101.14
Net Present Value [$]	$ 920.2	$ 1,000.17	$ 1,047.84	$ 1,065.57	$ 1,113.43	$ 1,192.24	$ 1,258.38	$ 1,296.3	$ 1,308.1	$ 1,434.59
Incremental dollars per GHG saving	$ 6.05	$ 6.09	$ 6.16	$ 6.12	$ 6.19	$ 6.23	$ 6.26	$ 6.39	$ 6.4	$ 6.51
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.7	8.3	8.3	8	8.3	8	9.1	9.1	9.1
Annual Energy DHW [GJ/yr]	12.4	11.7	12.4	11.7	12.4	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	8.8	9.2	8.8	8.8	8.4	8.8	8.4	9.7	9.7	9.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	47.4	47	47.3	46.7	47	46.6	46.3	47.5	47.5	47.4
Design Heating Load [W]	4411.7	4502.6	4432.2	4411.7	4341.3	4432.2	4341.3	4679.7	4411.7	4432.2
Annual Energy Electricity [kWh/yr]	7305.1	7306.9	7304.8	7305.2	7303.2	7304.9	7303.2	7309.3	7309.3	7308.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 970.36	$ 970.61	$ 970.31	$ 970.37	$ 970.09	$ 970.33	$ 970.09	$ 970.95	$ 970.95	$ 970.89
Annual Energy Natural Gas [m3/yr]	566	556.4	564.4	547.5	555.5	545.8	537	569.4	569	567.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 244.15	$ 240.01	$ 243.46	$ 236.17	$ 239.62	$ 235.44	$ 231.64	$ 245.62	$ 245.45	$ 244.71
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21029	17898	18167	21030	21299	18168	21300	15036	20976	18114
Upgrade Package List	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2231102031	Pkg2211102031	Pkg2231101021	Pkg2221102021
GHGI [kg/m2]	11.39	11.21	11.36	11.04	11.19	11.01	10.85	11.45	11.45	11.41
% ICC	2.9%	3.0%	3.0%	3.1%	3.1%	3.1%	3.2%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Target MEUI no cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target MEUI cooling [kWh/(m2 * yr)]	78	78	78	78	78	78	78	78	78	78
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.7	23.6	22.5	22.7	21.6	22.5	21.7	24.8	24.8	24.6
Output: MEUI [kWh/(m2 * yr)]	59.1	58.2	59	57.3	58	57.1	56.2	59.5	59.5	59.3
Output: Better than ERS (%)	2190.0%	2260.0%	2210.0%	2310.0%	2260.0%	2320.0%	2370.0%	2170.0%	2170.0%	2190.0%
Output: Better than Envelope (%)	2780.0%	2430.0%	2780.0%	2780.0%	3040.0%	2780.0%	3040.0%	2090.0%	2090.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	359	357	359	359	361	359	361	355	355	355
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 50.59	$ 50.34	$ 50.63	$ 50.58	$ 50.86	$ 50.62	$ 50.86	$ 50.	$ 50.	$ 50.05
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 50.77	$ 50.52	$ 50.81	$ 50.76	$ 51.04	$ 50.8	$ 51.04	$ 50.18	$ 50.18	$ 50.23
Annual savings in GHG from electricity savings [kg CO2e/year]	3.9	3.9	4	3.9	4	3.9	4	3.9	3.9	3.9
Annual savings in natural gas [m3/year]	21.19	21.55	21.25	21.88	21.58	21.94	22.27	21.06	21.08	21.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 196.32	$ 199.63	$ 196.87	$ 202.7	$ 199.94	$ 203.29	$ 206.33	$ 195.14	$ 195.28	$ 195.87
Annual savings in carbon tax for natural gas [$/year]	$ 49.	$ 49.83	$ 49.14	$ 50.59	$ 49.9	$ 50.74	$ 51.5	$ 48.71	$ 48.74	$ 48.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 245.32	$ 249.46	$ 246.01	$ 253.3	$ 249.85	$ 254.03	$ 257.83	$ 243.85	$ 244.02	$ 244.76
Annual savings in GHG from natural gas savings [kg CO2e/year]	1088.9	1107.3	1092	1124.3	1109	1127.6	1144.4	1082.4	1083.1	1086.4
Net Present Value [$]	$ 920.2	$ 1,000.17	$ 1,047.84	$ 1,065.57	$ 1,113.43	$ 1,192.24	$ 1,258.38	$ 1,296.3	$ 1,308.1	$ 1,434.59
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	8.82	10.61	10.61	10.61	10.61	8.82	10.61
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 588.21
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$.	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 14,500.08	$ 14,644.36	$ 14,664.08	$ 14,786.08	$ 14,790.52	$ 14,800.08	$ 14,830.48	$ 14,844.64	$ 14,930.36	$ 14,944.36
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,500.08	$ 14,644.36	$ 14,664.08	$ 14,786.08	$ 14,790.52	$ 14,800.08	$ 14,830.48	$ 14,844.64	$ 14,930.36	$ 14,944.36
Net Present Value [$]	$ 13,096.29	$ 12,879.38	$ 13,241.11	$ 13,184.57	$ 13,168.11	$ 13,358.36	$ 13,260.23	$ 13,314.91	$ 13,240.27	
Incremental dollars per GHG saving	$ 9.59	$ 9.68	$ 9.69	$ 9.77	$ 9.77	$ 9.56	$ 9.81	$ 9.81	$ 9.87	$ 9.65
Auxiliary Energy Required Heating [GJ/yr]	6.7	6.4	5.4	6.3	6.4	6.7	6.6	6.6	6	6.4
Annual Energy DHW [GJ/yr]	12.4	12.4	12.4	12.4	12.4	11.7	12.4	12.4	12.4	11.7
Annual Energy Space Heating [GJ/yr]	2.4	2.3	2	2.2	2.3	2.4	2.3	2.3	2.2	2.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	47.3	47.2	46.9	47.2	47.1	46.6	47.3	47.2	47.1	46.5
Design Heating Load [W]	3533.4	3431.4	3629.9	3463.1	3473.1	3533.4	3400.4	3475.6	3361	3431.4
Annual Energy Electricity [kWh/yr]	9698.9	9671	9579.1	9672.2	9648.5	9699.3	9700.5	9656.9	9644.8	9671.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,309.08	$ 1,305.13	$ 1,292.13	$ 1,305.3	$ 1,301.95	$ 1,309.14	$ 1,309.31	$ 1,303.14	$ 1,301.42	$ 1,305.17
Annual Energy Natural Gas [m3/yr]	333	333	333	333	333	314.3	333	333	333	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 143.64	$ 143.64	$ 143.64	$ 143.64	$ 143.64	$ 135.58	$ 143.64	$ 143.64	$ 143.64	$ 135.58
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43520	45464	68	43736	37922	43521	47606	39650	45680	45465
Upgrade Package List	Pkg3321201033	Pkg3331201033	Pkg11111010Test4	Pkg3321202033	Pkg3231202034	Pkg3321201033	Pkg3341202032	Pkg3241201034	Pkg3331202033	Pkg3331201033
GHGI [kg/m2]	7.28	7.28	7.27	7.28	7.28	6.93	7.28	7.28	7.28	6.93
% ICC	6.4%	6.5%	6.5%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.1	17.3	14.6	17.2	17.5	18.1	18	17.9	16.4	17.3
Output: MEUI [kWh/(m2 * yr)]	56.3	56	55.1	56	55.9	54.4	56.3	55.9	55.8	54.1
Output: Better than ERS (%)	2800.0%	2820.0%	2860.0%	2820.0%	2830.0%	2910.0%	2800.0%	2820.0%	2830.0%	2920.0%
Output: Better than Envelope (%)	4170.0%	4430.0%	5300.0%	4520.0%	4430.0%	4170.0%	4260.0%	4260.0%	4780.0%	4430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2035	2007	1915	2008	1985	2035	2037	1993	1981	2007
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 286.93	$ 283.	$ 270.04	$ 283.17	$ 279.83	$ 286.99	$ 287.16	$ 281.01	$ 279.31	$ 283.04
Annual savings in carbon tax for electricity [$/year]	$ 1.02	$ 1.	$ .96	$ 1.	$ .99	$ 1.02	$ 1.02	$ 1.	$ .99	$ 1.
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 287.95	$ 284.	$ 271.	$ 284.17	$ 280.82	$ 288.01	$ 288.18	$ 282.01	$ 280.3	$ 284.05
Annual savings in GHG from electricity savings [kg CO2e/year]	22.4	22.1	21.1	22.1	21.8	22.4	22.4	21.9	21.8	22.1
Annual savings in natural gas [m3/year]	29.87	29.87	29.87	29.87	29.87	30.57	29.87	29.87	29.87	30.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 276.75	$ 276.75	$ 276.75	$ 276.75	$ 276.75	$ 283.21	$ 276.75	$ 276.75	$ 276.75	$ 283.21
Annual savings in carbon tax for natural gas [$/year]	$ 69.08	$ 69.08	$ 69.08	$ 69.08	$ 69.08	$ 70.69	$ 69.08	$ 69.08	$ 69.08	$ 70.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 345.83	$ 345.83	$ 345.83	$ 345.83	$ 345.83	$ 353.89	$ 345.83	$ 345.83	$ 345.83	$ 353.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	1535	1535	1535	1535	1535	1570.8	1535	1535	1535	1570.8
Net Present Value [$]	$ 13,023.76	$ 13,096.29	$ 12,879.38	$ 13,241.11	$ 13,184.57	$ 13,168.11	$ 13,358.36	$ 13,260.23	$ 13,314.91	$ 13,240.27
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	14.09	10.61	10.61	8.82	10.61	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 1,507.	$ 682.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,025.91	$ 3,665.75	$ 3,665.75	$ 3,025.91	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 589.42	$ 589.42	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 1,947.	$.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 550.	$ 550.	$ 850.

SMALL Vancouver: Step5 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 19,147.83	$ 19,172.83	$ 19,334.83	$ 19,357.71	$ 19,423.71	$ 19,448.71	$ 19,488.83	$ 19,544.71	$ 19,657.71	$ 19,681.48
ICC with multiplier (Van=1.0,this Cz =1)	$ 19,147.83	$ 19,172.83	$ 19,334.83	$ 19,357.71	$ 19,423.71	$ 19,448.71	$ 19,488.83	$ 19,544.71	$ 19,657.71	$ 19,681.48
Net Present Value [$]	$ 19,390.85	$ 19,390.31	$ 19,926.06	$ 19,813.28	$ 20,092.17	$ 19,582.02	$ 19,767.11	$ 19,754.7	$ 19,836.84	$ 19,637.68
Incremental dollars per GHG saving	$ 9.	$ 9.	$ 9.08	$ 9.09	$ 9.12	$ 9.13	$ 9.15	$ 9.17	$ 9.22	$ 9.23
Auxiliary Energy Required Heating [GJ/yr]	6.6	6.7	6.7	6.6	6.6	6.7	6.6	6.6	6.4	6.6
Annual Energy DHW [GJ/yr]	7.6	6.7	7.6	7.1	7.6	6.7	7.1	7.1	6.7	6.7
Annual Energy Space Heating [GJ/yr]	2.4	2.4	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	41.9	41.2	41.7	41.5	41.8	41.1	41.3	41.2	41.1	40.8
Design Heating Load [W]	3167.9	3209.2	3090.9	3235.7	3177	3218.3	3148.8	3162	3235.7	3133.7
Annual Energy Electricity [kWh/yr]	11649.8	11440.2	11585.4	11532.7	11615.4	11407.5	11463.8	11437.3	11425.3	11338.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,585.13	$ 1,555.47	$ 1,576.02	$ 1,568.56	$ 1,580.26	$ 1,550.85	$ 1,558.81	$ 1,555.06	$ 1,553.36	$ 1,541.11
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	47968	47754	49048	46025	46672	46458	48401	47105	46026	52668
Upgrade Package List	Pkg3341203054	Pkg3341202054	Pkg3341402054	Pkg3331203054	Pkg3331303054	Pkg3331302054	Pkg3341302054	Pkg3331402054	Pkg3331203054	Pkg4341403034
GHGI [kg/m2]	1.25	1.23	1.25	1.24	1.25	1.23	1.23	1.23	1.23	1.22
% ICC	8.5%	8.5%	8.6%	8.6%	8.6%	8.6%	8.6%	8.7%	8.7%	8.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	18.1	18.2	18.1	17.9	18	18.1	18	18	17.5	18
Output: MEUI [kWh/(m2 * yr)]	42	39.9	41.5	40.8	41.7	39.6	40.2	40	39.7	39.1
Output: Better than ERS (%)	3590.0%	3700.0%	3620.0%	3650.0%	3610.0%	3720.0%	3690.0%	3700.0%	3720.0%	3760.0%
Output: Better than Envelope (%)	4260.0%	4170.0%	4170.0%	4260.0%	4260.0%	4170.0%	4260.0%	4260.0%	4430.0%	4260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3986	3776	3922	3869	3952	3744	3800	3773	3761	3675
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 562.01	$ 532.46	$ 552.93	$ 545.5	$ 557.16	$ 527.85	$ 535.79	$ 532.05	$ 530.36	$ 518.15
Annual savings in carbon tax for electricity [$/year]	$ 1.99	$ 1.89	$ 1.96	$ 1.93	$ 1.98	$ 1.87	$ 1.9	$ 1.89	$ 1.88	$ 1.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 564.	$ 534.35	$ 554.89	$ 547.44	$ 559.14	$ 529.72	$ 537.69	$ 533.94	$ 532.24	$ 519.98
Annual savings in GHG from electricity savings [kg CO2e/year]	43.8	41.5	43.1	42.6	43.5	41.2	41.8	41.5	41.4	40.4
Annual savings in natural gas [m3/year]	42.28	42.28	42.28	42.28	42.28	42.28	42.28	42.28	42.28	42.28
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7	$ 391.7
Annual savings in carbon tax for natural gas [$/year]	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77	$ 97.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47	$ 489.47
Annual savings in GHG from natural gas savings [kg CO2e/year]	2172.6	2172.6	2172.6	2172.6	2172.6	2172.6	2172.6	2172.6	2172.6	2172.6
Net Present Value [$]	$ 19,904.85	$ 19,390.31	$ 19,926.06	$ 19,813.28	$ 20,092.17	$ 19,582.02	$ 19,767.11	$ 19,754.7	$ 19,836.84	$ 19,637.68
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	14.09	10.61	10.61	10.61	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 682.	$ 682.	$ 1,507.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 249.3	$ 589.42	$ 249.3	$ 249.3	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR10	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 1,947.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,563.	$ 2,563.	$ 2,959.	$ 1,947.	$ 2,959.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.

SMALL Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,664.08	$ 14,964.08	$ 14,500.08	$ 14,644.36	$ 14,800.08	$ 14,790.52	$ 14,944.36	$ 14,786.08	$ 14,844.64	$ 14,930.36
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,664.08	$ 14,964.08	$ 14,500.08	$ 14,644.36	$ 14,800.08	$ 14,790.52	$ 14,944.36	$ 14,786.08	$ 14,844.64	$ 14,930.36
Net Present Value [$]	$ 12,879.38	$ 13,023.54	$ 13,023.76	$ 13,096.29	$ 13,168.11	$ 13,184.57	$ 13,240.27	$ 13,241.11	$ 13,260.23	$ 13,314.91
Incremental dollars per GHG saving	$ 9.69	$ 9.66	$ 9.59	$ 9.68	$ 9.56	$ 9.77	$ 9.65	$ 9.77	$ 9.81	$ 9.87
Auxiliary Energy Required Heating [GJ/yr]	5.4	5.4	6.7	6.4	6.7	6.4	6.4	6.3	6.6	6
Annual Energy DHW [GJ/yr]	12.4	11.7	12.4	12.4	11.7	12.4	11.7	12.4	12.4	12.4
Annual Energy Space Heating [GJ/yr]	2	2	2.4	2.3	2.4	2.3	2.3	2.2	2.3	2.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	46.9	46.2	47.3	47.2	46.6	47.1	46.5	47.2	47.2	47.1
Design Heating Load [W]	3629.9	3629.9	3533.4	3431.4	3533.4	3473.1	3431.4	3463.1	3475.6	3361
Annual Energy Electricity [kWh/yr]	9579.1	9579.4	9698.9	9671	9699.3	9648.5	9671.3	9672.2	9656.9	9644.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,292.13	$ 1,292.17	$ 1,309.08	$ 1,305.13	$ 1,309.14	$ 1,301.95	$ 1,305.17	$ 1,305.3	$ 1,303.14	$ 1,301.42
Annual Energy Natural Gas [m3/yr]	333	314.3	333	333	314.3	333	314.3	333	333	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 143.64	$ 135.58	$ 143.64	$ 143.64	$ 135.58	$ 143.64	$ 135.58	$ 143.64	$ 143.64	$ 143.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	68	69	43520	45464	43521	37922	45465	43736	39650	45680
Upgrade Package List	Pkg11111010Test4	Pkg11111010Test4	Pkg3321201033	Pkg3331201033	Pkg3321201033	Pkg3231202034	Pkg3331201033	Pkg3321202033	Pkg3241201034	Pkg3331202033
GHGI [kg/m2]	7.27	6.92	7.28	7.28	6.93	7.28	6.93	7.28	7.28	7.28
% ICC	6.5%	6.6%	6.4%	6.5%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	14.6	14.6	18.1	17.3	18.1	17.5	17.3	17.2	17.9	16.4
Output: MEUI [kWh/(m2 * yr)]	55.1	53.3	56.3	56	54.4	55.9	54.1	56	55.9	55.8
Output: Better than ERS (%)	2860.0%	2970.0%	2800.0%	2820.0%	2910.0%	2830.0%	2920.0%	2820.0%	2820.0%	2830.0%
Output: Better than Envelope (%)	5300.0%	5300.0%	4170.0%	4430.0%	4170.0%	4430.0%	4430.0%	4520.0%	4260.0%	4780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1915	1916	2035	2007	2035	1985	2007	2008	1993	1981
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 270.04	$ 270.09	$ 286.93	$ 283.	$ 286.99	$ 279.83	$ 283.04	$ 283.17	$ 281.01	$ 279.31
Annual savings in carbon tax for electricity [$/year]	$ .96	$ .96	$ 1.02	$ 1.	$ 1.02	$ .99	$ 1.	$ 1.	$ 1.	$ .99
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 271.	$ 271.04	$ 287.95	$ 284.	$ 288.01	$ 280.82	$ 284.05	$ 284.17	$ 282.01	$ 280.3
Annual savings in GHG from electricity savings [kg CO2e/year]	21.1	21.1	22.4	22.1	22.4	21.8	22.1	22.1	21.9	21.8
Annual savings in natural gas [m3/year]	29.87	30.57	29.87	29.87	30.57	29.87	30.57	29.87	29.87	29.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 276.75	$ 283.21	$ 276.75	$ 276.75	$ 283.21	$ 276.75	$ 283.21	$ 276.75	$ 276.75	$ 276.75
Annual savings in carbon tax for natural gas [$/year]	$ 69.08	$ 70.69	$ 69.08	$ 69.08	$ 70.69	$ 69.08	$ 70.69	$ 69.08	$ 69.08	$ 69.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 345.83	$ 353.89	$ 345.83	$ 345.83	$ 353.89	$ 345.83	$ 353.89	$ 345.83	$ 345.83	$ 345.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	1535	1570.8	1535	1535	1570.8	1535	1570.8	1535	1535	1535
Net Present Value [$]	$ 12,879.38	$ 13,023.54	$ 13,023.76	$ 13,096.29	$ 13,168.11	$ 13,184.57	$ 13,240.27	$ 13,241.11	$ 13,260.23	$ 13,314.91
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	8.82	8.82	8.82	10.61	8.82	10.61	8.82	10.61
Attic Ceiling Code	CeilR80	CeilR80	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 1,507.	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,025.91	$ 3,665.75	$ 3,665.75	$ 3,025.91	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 589.42	$ 249.3
Foundation Slab Below Grade Code	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.	$ 1,947.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.	$ 550.

SMALL Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 4,597.76	$ 4,739.48	$ 4,848.46	$ 4,883.76	$ 4,953.48	$ 5,005.38	$ 5,097.76	$ 5,134.46	$ 5,147.76	$ 5,149.66
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 4,933.4	$ 5,085.46	$ 5,202.4	$ 5,240.27	$ 5,315.08	$ 5,370.77	$ 5,469.9	$ 5,509.28	$ 5,523.55	$ 5,525.59
Net Present Value [$]	$ 899.04	$ 778.73	$ 589.	$ 735.53	$ 747.3	$ 464.96	$ 704.1	$ 426.41	$ 590.29	$ 423.4
Incremental dollars per GHG saving	$ 4.38	$ 4.5	$ 4.68	$ 4.54	$ 4.53	$ 4.8	$ 4.57	$ 4.83	$ 4.66	$ 4.84
Auxiliary Energy Required Heating [GJ/yr]	15.6	15.6	15.9	15.1	14.8	15.7	14.4	15.4	15.6	15.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5
Annual Energy Space Heating [GJ/yr]	16.6	16.5	16.8	16	15.7	16.7	15.3	16.3	16.6	16.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	56.2	56.1	56.4	55.7	55.3	56.3	54.9	55.9	55.1	55.9
Design Heating Load [W]	5950.8	5982.1	6163.3	5861	5838	5838	5717	6073.6	5950.8	5717
Annual Energy Electricity [kWh/yr]	7343.8	7343.3	7345.1	7341.2	7339.4	7344.4	7337.3	7342.4	7343.9	7342.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 975.83	$ 975.76	$ 976.02	$ 975.46	$ 975.21	$ 975.92	$ 974.91	$ 975.63	$ 975.85	$ 975.61
Annual Energy Natural Gas [m3/yr]	798.8	796.4	805.5	785	775.8	801.8	764.4	791.6	770	790.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 344.57	$ 343.54	$ 347.46	$ 338.62	$ 334.65	$ 345.87	$ 329.74	$ 341.47	$ 332.15	$ 340.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	56200	54850	62680	56470	64300	64246	65920	62950	56201	65866
Upgrade Package List	Pkg1131101031	Pkg1121102031	Pkg2111101031	Pkg1131102031	Pkg2121101031	Pkg2121101021	Pkg2131101031	Pkg2111102031	Pkg1131101031	Pkg2131101021
GHGI [kg/m2]	15.76	15.71	15.88	15.5	15.32	15.81	15.11	15.62	15.22	15.59
% ICC	2.0%	2.1%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.5	42.3	43.1	41.2	40.3	42.8	39.1	41.8	42.5	41.7
Output: MEUI [kWh/(m2 * yr)]	83.1	82.8	83.8	81.6	80.7	83.4	79.5	82.3	80.2	82.2
Output: Better than ERS (%)	1800.0%	1810.0%	1770.0%	1870.0%	1930.0%	1780.0%	1990.0%	1840.0%	1960.0%	1840.0%
Output: Better than Envelope (%)	710.0%	710.0%	540.0%	1010.0%	1190.0%	650.0%	1430.0%	830.0%	710.0%	890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	360	360	359	363	364	359	366	361	360	362
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 50.76	$ 50.83	$ 50.58	$ 51.13	$ 51.38	$ 50.68	$ 51.68	$ 50.96	$ 50.75	$ 50.99
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 50.94	$ 51.01	$ 50.76	$ 51.31	$ 51.56	$ 50.86	$ 51.86	$ 51.14	$ 50.93	$ 51.17
Annual savings in GHG from electricity savings [kg CO2e/year]	4	4	3.9	4	4	4	4	4	4	4
Annual savings in natural gas [m3/year]	20.33	20.42	20.08	20.84	21.19	20.22	21.61	20.6	21.4	20.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 188.34	$ 189.17	$ 186.03	$ 193.11	$ 196.28	$ 187.31	$ 200.22	$ 190.83	$ 198.29	$ 191.31
Annual savings in carbon tax for natural gas [$/year]	$ 47.01	$ 47.22	$ 46.43	$ 48.2	$ 48.99	$ 46.75	$ 49.97	$ 47.63	$ 49.49	$ 47.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 235.35	$ 236.39	$ 232.46	$ 241.31	$ 245.27	$ 234.06	$ 250.19	$ 238.46	$ 247.78	$ 239.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	1044.7	1049.3	1031.8	1071.1	1088.7	1038.9	1110.5	1058.4	1099.8	1061.1
Net Present Value [$]	$ 899.04	$ 778.73	$ 589.	$ 735.53	$ 747.3	$ 464.96	$ 704.1	$ 426.41	$ 590.29	$ 423.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	8.82	10.61	8.82	8.82	8.82	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$.	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$.	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

SMALL Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 10,267.52	$ 7,117.52	$ 7,747.76	$ 7,889.48	$ 10,817.52	$ 10,831.52	$ 7,998.46	$ 8,033.76	$ 10,973.24	$ 8,297.76
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 11,017.05	$ 7,637.1	$ 8,313.35	$ 8,465.41	$ 11,607.2	$ 11,622.22	$ 8,582.35	$ 8,620.22	$ 11,774.29	$ 8,903.5
Net Present Value [$]	$ 12,131.68	$ 4,111.77	$ 7,651.3	$ 7,777.32	$ 12,347.74	$ 12,189.19	$ 7,948.74	$ 7,855.68	$ 12,321.97	$ 7,958.72
Incremental dollars per GHG saving	$ 4.08	$ 4.18	$ 4.2	$ 4.27	$ 4.29	$ 4.3	$ 4.33	$ 4.35	$ 4.35	$ 4.36
Auxiliary Energy Required Heating [GJ/yr]	15.9	15.9	15.6	15.6	15.6	15.9	15.9	15.1	15.8	15.6
Annual Energy DHW [GJ/yr]	7.6	7.6	13.5	13.5	7.1	6.7	13.5	13.5	6.7	12.4
Annual Energy Space Heating [GJ/yr]	6.1	16.9	6	6	6	6.1	6.1	5.8	6.1	6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	46.1	50.6	52.6	52.6	45.6	45.4	52.7	52.5	45.4	51.5
Design Heating Load [W]	5578.7	5524.9	6006.3	6037.7	5578.7	5668.4	6212.2	5916.6	5699.7	6006.3
Annual Energy Electricity [kWh/yr]	12802	9462.9	10862.3	10856.2	12672.3	12605.3	10880.5	10830.6	12601.8	10863.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,748.17	$ 1,275.69	$ 1,473.7	$ 1,472.84	$ 1,729.82	$ 1,720.33	$ 1,476.28	$ 1,469.21	$ 1,719.84	$ 1,473.81
Annual Energy Natural Gas [m3/yr]	0	444.9	362.1	362.1	0	0	362.1	362.1	0	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 191.91	$ 156.2	$ 156.2	$.	$.	$ 156.2	$ 156.2	$.	$ 143.6
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	74086	74077	56209	54859	74087	73818	62689	56479	70956	56210
Upgrade Package List	Pkg2231102031	Pkg2231102031	Pkg1131101031	Pkg1121102031	Pkg2231102031	Pkg2231101031	Pkg2111101031	Pkg1131102031	Pkg2221102031	Pkg1131101031
GHGI [kg/m2]	1.38	9.35	7.95	7.95	1.36	1.36	7.96	7.95	1.36	7.41
% ICC	4.6%	3.2%	3.4%	3.5%	4.8%	4.8%	3.5%	3.6%	4.9%	3.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	43.3	43.3	42.5	42.3	42.4	43.2	43.1	41.2	43	42.5
Output: MEUI [kWh/(m2 * yr)]	52.6	68	69.9	69.8	51.2	50.5	70.1	69.6	50.5	66.9
Output: Better than ERS (%)	3870.0%	2590.0%	3010.0%	3010.0%	3940.0%	3960.0%	3000.0%	3030.0%	3960.0%	3160.0%
Output: Better than Envelope (%)	540.0%	540.0%	710.0%	710.0%	710.0%	540.0%	540.0%	1010.0%	600.0%	710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5098	1759	3158	3152	4968	4902	3177	3127	4898	3159
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 718.85	$ 248.03	$ 445.35	$ 444.49	$ 700.56	$ 691.11	$ 447.91	$ 440.88	$ 690.62	$ 445.46
Annual savings in carbon tax for electricity [$/year]	$ 2.55	$ .88	$ 1.58	$ 1.58	$ 2.48	$ 2.45	$ 1.59	$ 1.56	$ 2.45	$ 1.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 721.4	$ 248.91	$ 446.93	$ 446.06	$ 703.04	$ 693.56	$ 449.5	$ 442.44	$ 693.07	$ 447.04
Annual savings in GHG from electricity savings [kg CO2e/year]	56.1	19.4	34.7	34.7	54.7	53.9	34.9	34.4	53.9	34.8
Annual savings in natural gas [m3/year]	50.09	33.51	36.6	36.6	50.09	50.09	36.6	36.6	50.09	37.69
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 464.09	$ 310.51	$ 339.09	$ 339.09	$ 464.09	$ 464.09	$ 339.09	$ 339.09	$ 464.09	$ 349.17
Annual savings in carbon tax for natural gas [$/year]	$ 115.84	$ 77.5	$ 84.64	$ 84.64	$ 115.84	$ 115.84	$ 84.64	$ 84.64	$ 115.84	$ 87.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 579.93	$ 388.01	$ 423.73	$ 423.73	$ 579.93	$ 579.93	$ 423.73	$ 423.73	$ 579.93	$ 436.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	2574.1	1722.3	1880.8	1880.8	2574.1	2574.1	1880.8	1880.8	2574.1	1936.7
Net Present Value [$]	$ 12,131.68	$ 4,111.77	$ 7,651.3	$ 7,777.32	$ 12,347.74	$ 12,189.19	$ 7,948.74	$ 7,855.68	$ 12,321.97	$ 7,958.72
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	10.61	8.82	10.61	10.61	8.82	8.82	10.61	10.61	8.82
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$.	$ 249.3	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	NBC gas furnace	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 850.	$.	$.	$ 850.	$ 550.

SMALL Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 4,597.76	$ 4,739.48	$ 4,953.48	$ 4,883.76	$ 5,097.76	$ 5,147.76	$ 4,848.46	$ 5,239.48	$ 5,383.76	$ 5,289.48
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 4,933.4	$ 5,085.46	$ 5,315.08	$ 5,240.27	$ 5,469.9	$ 5,523.55	$ 5,202.4	$ 5,621.96	$ 5,776.77	$ 5,675.61
Net Present Value [$]	$ 899.04	$ 778.73	$ 747.3	$ 735.53	$ 704.1	$ 590.29	$ 589.	$ 583.8	$ 539.44	$ 469.74
Incremental dollars per GHG saving	$ 4.38	$ 4.5	$ 4.53	$ 4.54	$ 4.57	$ 4.66	$ 4.68	$ 4.68	$ 4.72	$ 4.77
Auxiliary Energy Required Heating [GJ/yr]	15.6	15.6	14.8	15.1	14.4	15.6	15.9	14.3	13.9	15.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	16.6	16.5	15.7	16	15.3	16.6	16.8	15.2	14.7	16.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	56.2	56.1	55.3	55.7	54.9	55.1	56.4	54.8	54.4	55
Design Heating Load [W]	5950.8	5982.1	5838	5861	5717	5950.8	6163.3	5748.3	5627.2	5982.1
Annual Energy Electricity [kWh/yr]	7343.8	7343.3	7339.4	7341.2	7337.3	7343.9	7345.1	7336.8	7334.7	7343.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 975.83	$ 975.76	$ 975.21	$ 975.46	$ 974.91	$ 975.85	$ 976.02	$ 974.84	$ 974.55	$ 975.78
Annual Energy Natural Gas [m3/yr]	798.8	796.4	775.8	785	764.4	770	805.5	762	750.7	767.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 344.57	$ 343.54	$ 334.65	$ 338.62	$ 329.74	$ 332.15	$ 347.46	$ 328.7	$ 323.83	$ 331.12
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	56200	54850	64300	56470	65920	56201	62680	64570	66190	54851
Upgrade Package List	Pkg1131101031	Pkg1121102031	Pkg2121101031	Pkg1131102031	Pkg2131101031	Pkg1131101031	Pkg2111101031	Pkg2121102031	Pkg2131102031	Pkg1121102031
GHGI [kg/m2]	15.76	15.71	15.32	15.5	15.11	15.22	15.88	15.07	14.85	15.17
% ICC	2.0%	2.1%	2.2%	2.2%	2.3%	2.3%	2.2%	2.3%	2.4%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	42.5	42.3	40.3	41.2	39.1	42.5	43.1	38.9	37.8	42.3
Output: MEUI [kWh/(m2 * yr)]	83.1	82.8	80.7	81.6	79.5	80.2	83.8	79.3	78.1	79.9
Output: Better than ERS (%)	1800.0%	1810.0%	1930.0%	1870.0%	1990.0%	1960.0%	1770.0%	2000.0%	2060.0%	1970.0%
Output: Better than Envelope (%)	710.0%	710.0%	1190.0%	1010.0%	1430.0%	710.0%	540.0%	1490.0%	1730.0%	710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	360	360	364	363	366	360	359	367	369	360
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 50.76	$ 50.83	$ 51.38	$ 51.13	$ 51.68	$ 50.75	$ 50.58	$ 51.75	$ 52.04	$ 50.82
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18	$ .18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 50.94	$ 51.01	$ 51.56	$ 51.31	$ 51.86	$ 50.93	$ 50.76	$ 51.93	$ 52.23	$ 51.
Annual savings in GHG from electricity savings [kg CO2e/year]	4	4	4	4	4	4	3.9	4	4.1	4
Annual savings in natural gas [m3/year]	20.33	20.42	21.19	20.84	21.61	21.4	20.08	21.7	22.12	21.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 188.34	$ 189.17	$ 196.28	$ 193.11	$ 200.22	$ 198.29	$ 186.03	$ 201.05	$ 204.95	$ 199.11
Annual savings in carbon tax for natural gas [$/year]	$ 47.01	$ 47.22	$ 48.99	$ 48.2	$ 49.97	$ 49.49	$ 46.43	$ 50.18	$ 51.15	$ 49.7
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 235.35	$ 236.39	$ 245.27	$ 241.31	$ 250.19	$ 247.78	$ 232.46	$ 251.23	$ 256.1	$ 248.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	1044.7	1049.3	1088.7	1071.1	1110.5	1099.8	1031.8	1115.1	1136.8	1104.4
Net Present Value [$]	$ 899.04	$ 778.73	$ 747.3	$ 735.53	$ 704.1	$ 590.29	$ 589.	$ 583.8	$ 539.44	$ 469.74
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	8.82	10.61	8.82	8.82	8.82	10.61	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$.	$ 105.02	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.

SMALL Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,893.52	$ 6,907.52	$ 7,049.24	$ 7,193.52	$ 8,385.87	$ 8,417.83	$ 8,527.59	$ 8,562.11	$ 8,563.24	$ 8,671.87
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,396.75	$ 7,411.77	$ 7,563.83	$ 7,718.65	$ 8,998.04	$ 9,032.33	$ 9,150.1	$ 9,187.14	$ 9,188.36	$ 9,304.92
Net Present Value [$]	$ 261.22	$ 238.91	$ 359.57	$ 406.41	$ 1,739.15	$ 1,812.32	$ 1,860.79	$ 1,858.19	$ 2,400.8	$ 1,910.23
Incremental dollars per GHG saving	$ 5.31	$ 5.29	$ 5.38	$ 5.4	$ 6.47	$ 6.51	$ 6.55	$ 6.51	$ 6.39	$ 6.56
Auxiliary Energy Required Heating [GJ/yr]	12	12.5	12.4	12	11	12.8	10.9	12.4	11.8	10.5
Annual Energy DHW [GJ/yr]	12.4	11.7	11.7	11.7	13.5	11.7	13.5	11.7	11.7	13.5
Annual Energy Space Heating [GJ/yr]	12.7	13.3	13.2	12.8	11.6	13.5	11.6	13.1	12.5	11.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.5
Total Energy [GJ/yr]	51.3	51.1	51	50.6	51.3	51.4	51.2	51	51.3	50.8
Design Heating Load [W]	5376.6	5466.3	5497.7	5376.6	5268.1	5550.1	5299.5	5429	4913.4	5178.4
Annual Energy Electricity [kWh/yr]	7324.8	7327.3	7326.9	7324.8	7319.2	7328.7	7318.8	7326.6	7586.3	7316.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 973.14	$ 973.5	$ 973.44	$ 973.14	$ 972.35	$ 973.7	$ 972.3	$ 973.4	$ 1,010.15	$ 972.01
Annual Energy Natural Gas [m3/yr]	669.1	664	661.6	650.6	669.1	671.1	666.8	660	644.8	656.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 288.63	$ 286.43	$ 285.39	$ 280.65	$ 288.63	$ 289.49	$ 287.63	$ 284.7	$ 278.14	$ 283.02
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	74075	73806	70944	74076	73912	64680	71050	66300	70710	74182
Upgrade Package List	Pkg2231102031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2231101051	Pkg2121102051	Pkg2221102051	Pkg2131102051	Pkg2221101033	Pkg2231102051
GHGI [kg/m2]	13.32	13.23	13.18	12.98	13.32	13.36	13.28	13.15	12.9	13.08
% ICC	3.1%	3.1%	3.1%	3.2%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.7	34	33.8	32.7	29.9	34.7	29.7	33.7	32.2	28.6
Output: MEUI [kWh/(m2 * yr)]	69.8	69.3	69	67.9	69.7	70	69.5	68.9	69.9	68.4
Output: Better than ERS (%)	2510.0%	2540.0%	2550.0%	2610.0%	2510.0%	2500.0%	2530.0%	2550.0%	2510.0%	2580.0%
Output: Better than Envelope (%)	2860.0%	2560.0%	2620.0%	2860.0%	3450.0%	2380.0%	3510.0%	2620.0%	2980.0%	3750.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	379	376	377	379	385	375	385	377	118	387
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 53.44	$ 53.09	$ 53.14	$ 53.44	$ 54.23	$ 52.89	$ 54.28	$ 53.19	$ 16.57	$ 54.57
Annual savings in carbon tax for electricity [$/year]	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .06	$ .19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 53.63	$ 53.27	$ 53.33	$ 53.63	$ 54.42	$ 53.08	$ 54.48	$ 53.37	$ 16.63	$ 54.76
Annual savings in GHG from electricity savings [kg CO2e/year]	4.2	4.1	4.1	4.2	4.2	4.1	4.2	4.1	1.3	4.3
Annual savings in natural gas [m3/year]	25.16	25.35	25.44	25.85	25.16	25.09	25.25	25.5	26.07	25.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 233.12	$ 234.88	$ 235.71	$ 239.5	$ 233.12	$ 232.43	$ 233.91	$ 236.26	$ 241.5	$ 237.6
Annual savings in carbon tax for natural gas [$/year]	$ 58.18	$ 58.62	$ 58.83	$ 59.78	$ 58.18	$ 58.01	$ 58.38	$ 58.97	$ 60.28	$ 59.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 291.3	$ 293.5	$ 294.54	$ 299.28	$ 291.3	$ 290.44	$ 292.29	$ 295.23	$ 301.78	$ 296.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	1293	1302.8	1307.4	1328.4	1293	1289.2	1297.4	1310.4	1339.5	1317.9
Net Present Value [$]	$ 261.22	$ 238.91	$ 359.57	$ 406.41	$ 1,739.15	$ 1,812.32	$ 1,860.79	$ 1,858.19	$ 2,400.8	$ 1,910.23
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	8.82	10.61	10.61	8.82	10.61	10.61	10.61	8.82	10.61
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 536.31	$ 2,864.66
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	3.87	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 3,025.91	$ 2,066.15	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	NA	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 850.	$.	$ 850.	$.	$ 850.	$ 850.	$.

SMALL Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,063.24	$ 9,207.52	$ 9,259.42	$ 9,613.24	$ 9,349.24	$ 9,401.14	$ 9,913.24	$ 9,757.52	$ 9,493.52	$ 9,809.42
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,724.86	$ 9,879.67	$ 9,935.36	$ 10,315.01	$ 10,031.73	$ 10,087.42	$ 10,636.91	$ 10,469.82	$ 10,186.55	$ 10,525.51
Net Present Value [$]	$ 8,422.31	$ 8,468.73	$ 8,179.74	$ 8,729.55	$ 8,595.84	$ 8,315.07	$ 8,873.71	$ 8,775.6	$ 8,632.39	$ 8,486.98
Incremental dollars per GHG saving	$ 4.9	$ 4.98	$ 5.	$ 5.05	$ 5.06	$ 5.08	$ 5.11	$ 5.12	$ 5.13	$ 5.15
Auxiliary Energy Required Heating [GJ/yr]	12.9	12.5	13.4	12.9	12.4	13.3	12.9	12.5	12	13.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	13.5	11.7	12.4	13.5	12.4
Annual Energy Space Heating [GJ/yr]	5	4.8	5.1	5	4.8	5.1	5	4.8	4.7	5.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	51.8	51.7	51.2	50.7	51.7	51.2	50	50.6	51.5	50.1
Design Heating Load [W]	5636.3	5515.2	5515.2	5636.3	5546.5	5546.5	5636.3	5515.2	5425.5	5515.2
Annual Energy Electricity [kWh/yr]	10650.8	10612.8	10480.4	10651.5	10607.1	10477.9	10651.9	10613.4	10565.3	10481.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,443.77	$ 1,438.4	$ 1,419.66	$ 1,443.87	$ 1,437.59	$ 1,419.31	$ 1,443.93	$ 1,438.48	$ 1,431.67	$ 1,419.76
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	332.9	362.1	362.1	314.2	332.9	362.1	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 135.53	$ 143.6	$ 156.2	$ 143.6
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70681	73813	73759	70682	70951	70897	70683	73814	74083	73760
Upgrade Package List	Pkg2221101031	Pkg2231101031	Pkg2231101021	Pkg2221101031	Pkg2221102031	Pkg2221102021	Pkg2221101031	Pkg2231101031	Pkg2231102031	Pkg2231101021
GHGI [kg/m2]	7.93	7.93	7.91	7.38	7.93	7.91	7.03	7.38	7.92	7.36
% ICC	4.0%	4.1%	4.1%	4.3%	4.1%	4.2%	4.4%	4.3%	4.2%	4.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35.1	34	36.4	35.1	33.8	36.1	35.1	34	32.7	36.4
Output: MEUI [kWh/(m2 * yr)]	67.7	67.3	66.4	64.7	67.2	66.4	62.8	64.3	66.8	63.5
Output: Better than ERS (%)	3120.0%	3130.0%	3200.0%	3270.0%	3130.0%	3200.0%	3360.0%	3280.0%	3160.0%	3350.0%
Output: Better than Envelope (%)	2320.0%	2560.0%	2020.0%	2320.0%	2620.0%	2080.0%	2320.0%	2560.0%	2860.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2947	2909	2777	2948	2903	2774	2948	2910	2862	2777
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 415.53	$ 410.17	$ 391.5	$ 415.63	$ 409.37	$ 391.15	$ 415.68	$ 410.25	$ 403.47	$ 391.6
Annual savings in carbon tax for electricity [$/year]	$ 1.47	$ 1.45	$ 1.39	$ 1.47	$ 1.45	$ 1.39	$ 1.47	$ 1.45	$ 1.43	$ 1.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 417.	$ 411.62	$ 392.89	$ 417.1	$ 410.82	$ 392.54	$ 417.16	$ 411.71	$ 404.9	$ 392.99
Annual savings in GHG from electricity savings [kg CO2e/year]	32.4	32	30.5	32.4	31.9	30.5	32.4	32	31.5	30.6
Annual savings in natural gas [m3/year]	36.6	36.6	36.6	37.69	36.6	36.6	38.38	37.69	36.6	37.69
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 339.09	$ 339.09	$ 339.09	$ 349.17	$ 339.09	$ 339.09	$ 355.63	$ 349.17	$ 339.09	$ 349.17
Annual savings in carbon tax for natural gas [$/year]	$ 84.64	$ 84.64	$ 84.64	$ 87.15	$ 84.64	$ 84.64	$ 88.76	$ 87.15	$ 84.64	$ 87.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 423.73	$ 423.73	$ 423.73	$ 436.33	$ 423.73	$ 423.73	$ 444.39	$ 436.33	$ 423.73	$ 436.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	1880.8	1880.8	1880.8	1936.7	1880.8	1880.8	1972.5	1936.7	1880.8	1936.7
Net Present Value [$]	$ 8,422.31	$ 8,468.73	$ 8,179.74	$ 8,729.55	$ 8,595.84	$ 8,315.07	$ 8,873.71	$ 8,775.6	$ 8,632.39	$ 8,486.98
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	8.82	10.61	10.61	8.82	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$ 550.

SMALL Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,907.52	$ 6,893.52	$ 7,049.24	$ 7,193.52	$ 8,385.87	$ 8,417.83	$ 8,562.11	$ 8,527.59	$ 8,671.87	$ 8,791.59
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,411.77	$ 7,396.75	$ 7,563.83	$ 7,718.65	$ 8,998.04	$ 9,032.33	$ 9,187.14	$ 9,150.1	$ 9,304.92	$ 9,433.38
Net Present Value [$]	$ 238.91	$ 261.22	$ 359.57	$ 406.41	$ 1,739.15	$ 1,812.32	$ 1,858.19	$ 1,860.79	$ 1,910.23	$ 1,999.66
Incremental dollars per GHG saving	$ 5.29	$ 5.31	$ 5.38	$ 5.4	$ 6.47	$ 6.51	$ 6.51	$ 6.55	$ 6.56	$ 6.6
Auxiliary Energy Required Heating [GJ/yr]	12.5	12	12.4	12	11	12.8	12.4	10.9	10.5	11.4
Annual Energy DHW [GJ/yr]	11.7	12.4	11.7	11.7	13.5	11.7	11.7	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	13.3	12.7	13.2	12.8	11.6	13.5	13.1	11.6	11.1	12.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	51.1	51.3	51	50.6	51.3	51.4	51	51.2	50.8	50.6
Design Heating Load [W]	5466.3	5376.6	5497.7	5376.6	5268.1	5550.1	5429	5299.5	5178.4	5389.2
Annual Energy Electricity [kWh/yr]	7327.3	7324.8	7326.9	7324.8	7319.2	7328.7	7326.6	7318.8	7316.8	7321.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 973.5	$ 973.14	$ 973.44	$ 973.14	$ 972.35	$ 973.7	$ 973.4	$ 972.3	$ 972.01	$ 972.65
Annual Energy Natural Gas [m3/yr]	664	669.1	661.6	650.6	669.1	671.1	660	666.8	656.1	651.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.43	$ 288.63	$ 285.39	$ 280.65	$ 288.63	$ 289.49	$ 284.7	$ 287.63	$ 283.02	$ 280.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	73806	74075	70944	74076	73912	64680	66300	71050	74182	70781
Upgrade Package List	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2231102031	Pkg2231101051	Pkg2121102051	Pkg2131102051	Pkg2221102051	Pkg2231102051	Pkg2221101051
GHGI [kg/m2]	13.23	13.32	13.18	12.98	13.32	13.36	13.15	13.28	13.08	12.99
% ICC	3.1%	3.1%	3.1%	3.2%	3.7%	3.7%	3.8%	3.8%	3.8%	3.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	34	32.7	33.8	32.7	29.9	34.7	33.7	29.7	28.6	31
Output: MEUI [kWh/(m2 * yr)]	69.3	69.8	69	67.9	69.7	70	68.9	69.5	68.4	67.9
Output: Better than ERS (%)	2540.0%	2510.0%	2550.0%	2610.0%	2510.0%	2500.0%	2550.0%	2530.0%	2580.0%	2610.0%
Output: Better than Envelope (%)	2560.0%	2860.0%	2620.0%	2860.0%	3450.0%	2380.0%	2620.0%	3510.0%	3750.0%	3210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	376	379	377	379	385	375	377	385	387	382
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 53.09	$ 53.44	$ 53.14	$ 53.44	$ 54.23	$ 52.89	$ 53.19	$ 54.28	$ 54.57	$ 53.93
Annual savings in carbon tax for electricity [$/year]	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19	$ .19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 53.27	$ 53.63	$ 53.33	$ 53.63	$ 54.42	$ 53.08	$ 53.37	$ 54.48	$ 54.76	$ 54.12
Annual savings in GHG from electricity savings [kg CO2e/year]	4.1	4.2	4.1	4.2	4.2	4.1	4.1	4.2	4.3	4.2
Annual savings in natural gas [m3/year]	25.35	25.16	25.44	25.85	25.16	25.09	25.5	25.25	25.65	25.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 234.88	$ 233.12	$ 235.71	$ 239.5	$ 233.12	$ 232.43	$ 236.26	$ 233.91	$ 237.6	$ 239.33
Annual savings in carbon tax for natural gas [$/year]	$ 58.62	$ 58.18	$ 58.83	$ 59.78	$ 58.18	$ 58.01	$ 58.97	$ 58.38	$ 59.3	$ 59.74
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 293.5	$ 291.3	$ 294.54	$ 299.28	$ 291.3	$ 290.44	$ 295.23	$ 292.29	$ 296.91	$ 299.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	1302.8	1293	1307.4	1328.4	1293	1289.2	1310.4	1297.4	1317.9	1327.5
Net Present Value [$]	$ 238.91	$ 261.22	$ 359.57	$ 406.41	$ 1,739.15	$ 1,812.32	$ 1,858.19	$ 1,860.79	$ 1,910.23	$ 1,999.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	10.61	10.61	8.82	10.61	10.61	10.61	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$ 850.	$ 850.	$.	$ 850.	$ 850.	$.	$.	$ 550.

SMALL Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,555.36	$ 16,686.48	$ 16,742.36	$ 16,895.48	$ 17,027.08	$ 17,082.48	$ 17,171.36	$ 17,346.36	$ 17,407.48	$ 17,414.43
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,763.9	$ 17,904.59	$ 17,964.55	$ 18,128.85	$ 18,270.06	$ 18,329.5	$ 18,424.87	$ 18,612.64	$ 18,678.23	$ 18,685.68
Net Present Value [$]	$ 15,642.55	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 16,029.	$ 15,977.41	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,580.13
Incremental dollars per GHG saving	$ 8.54	$ 8.6	$ 8.63	$ 8.71	$ 8.78	$ 8.8	$ 8.85	$ 8.94	$ 8.97	$ 8.98
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.4	8.4	8	8.4	8.2	8.1	8.2	8.3	8.4
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	3.3	3.3	3.3	3.2	3.4	3.2	3.2	3.2	3.3	3.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	50.2	50.1	50	50.1	50.1	50	50	50	50	50.3
Design Heating Load [W]	4075.6	3976	4010.2	3985.9	4151.7	3916.4	4015	3976	3893	4093.4
Annual Energy Electricity [kWh/yr]	10701.1	10655	10649.8	10677.8	10668	10626.4	10630.5	10631.6	10648.2	10731.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,450.89	$ 1,444.37	$ 1,443.63	$ 1,447.59	$ 1,446.21	$ 1,440.32	$ 1,440.9	$ 1,441.06	$ 1,443.41	$ 1,455.21
Annual Energy Natural Gas [m3/yr]	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	98691	101067	99771	100635	97395	101715	99339	104433	101913	96621
Upgrade Package List	Pkg3331203034	Pkg3341302034	Pkg3331402034	Pkg3341203034	Pkg3321303034	Pkg3341402034	Pkg3331303034	Pkg4331302034	Pkg3341403033	Pkg3321202053
GHGI [kg/m2]	7.04	7.03	7.03	7.04	7.03	7.03	7.03	7.03	7.03	7.04
% ICC	7.3%	7.4%	7.4%	7.5%	7.6%	7.6%	7.6%	7.7%	7.7%	7.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target MEUI cooling [kWh/(m2 * yr)]	63	63	63	63	63	63	63	63	63	63
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.5	22.8	22.9	21.9	23	22.2	22	22.3	22.4	22.9
Output: MEUI [kWh/(m2 * yr)]	62.8	62.4	62.4	62.6	62.6	62.2	62.2	62.2	62.4	63
Output: Better than ERS (%)	3330.0%	3350.0%	3360.0%	3350.0%	3350.0%	3360.0%	3360.0%	3360.0%	3360.0%	3320.0%
Output: Better than Envelope (%)	5060.0%	5000.0%	5000.0%	5240.0%	5000.0%	5120.0%	5180.0%	5120.0%	5060.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2997	2951	2946	2974	2964	2923	2927	2928	2944	3028
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 422.62	$ 416.12	$ 415.39	$ 419.33	$ 417.95	$ 412.09	$ 412.66	$ 412.82	$ 415.16	$ 426.92
Annual savings in carbon tax for electricity [$/year]	$ 1.5	$ 1.48	$ 1.47	$ 1.49	$ 1.48	$ 1.46	$ 1.46	$ 1.46	$ 1.47	$ 1.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 424.12	$ 417.59	$ 416.86	$ 420.82	$ 419.43	$ 413.55	$ 414.13	$ 414.28	$ 416.63	$ 428.43
Annual savings in GHG from electricity savings [kg CO2e/year]	33	32.5	32.4	32.7	32.6	32.1	32.2	32.2	32.4	33.3
Annual savings in natural gas [m3/year]	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63
Annual savings in carbon tax for natural gas [$/year]	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5
Net Present Value [$]	$ 15,642.55	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 16,029.	$ 15,977.41	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,580.13
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	14.09	10.61	14.09	10.61	14.09	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 105.02	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 105.02
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,563.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,959.	$ 1,947.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,555.36	$ 16,686.48	$ 16,742.36	$ 16,895.48	$ 17,027.08	$ 17,082.48	$ 17,171.36	$ 17,346.36	$ 17,407.48	$ 17,414.43
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,763.9	$ 17,904.59	$ 17,964.55	$ 18,128.85	$ 18,270.06	$ 18,329.5	$ 18,424.87	$ 18,612.64	$ 18,678.23	$ 18,685.68
Net Present Value [$]	$ 15,642.55	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 16,029.	$ 15,977.41	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,580.13
Incremental dollars per GHG saving	$ 8.54	$ 8.6	$ 8.63	$ 8.71	$ 8.78	$ 8.8	$ 8.85	$ 8.94	$ 8.97	$ 8.98
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.4	8.4	8	8.4	8.2	8.1	8.2	8.3	8.4
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	3.3	3.3	3.3	3.2	3.4	3.2	3.2	3.2	3.3	3.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	50.2	50.1	50	50.1	50.4	50	50	50	50	50.3
Design Heating Load [W]	4075.6	3976	4010.2	3985.9	4151.7	3916.4	4015	3976	3893	4093.4
Annual Energy Electricity [kWh/yr]	10701.1	10655	10649.8	10677.8	10668	10626.4	10630.5	10631.6	10648.2	10731.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,450.89	$ 1,444.37	$ 1,443.63	$ 1,447.59	$ 1,446.21	$ 1,440.32	$ 1,440.9	$ 1,441.06	$ 1,443.41	$ 1,455.21
Annual Energy Natural Gas [m3/yr]	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	98691	101067	99771	100635	97395	101715	99339	104433	101913	96621
Upgrade Package List	Pkg3331203034	Pkg3341302034	Pkg3331402034	Pkg3341203034	Pkg3321303034	Pkg3341402034	Pkg3331303034	Pkg4331302034	Pkg3341403033	Pkg3321202053
GHGI [kg/m2]	7.04	7.03	7.03	7.04	7.03	7.03	7.03	7.03	7.03	7.04
% ICC	7.3%	7.4%	7.4%	7.5%	7.6%	7.6%	7.6%	7.7%	7.7%	7.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target MEUI cooling [kWh/(m2 * yr)]	63	63	63	63	63	63	63	63	63	63
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.5	22.8	22.9	21.9	23	22.2	22	22.3	22.4	22.9
Output: MEUI [kWh/(m2 * yr)]	62.8	62.4	62.4	62.6	62.6	62.2	62.2	62.2	62.4	63
Output: Better than ERS (%)	3330.0%	3350.0%	3360.0%	3350.0%	3350.0%	3360.0%	3360.0%	3360.0%	3360.0%	3320.0%
Output: Better than Envelope (%)	5060.0%	5000.0%	5000.0%	5240.0%	5000.0%	5120.0%	5180.0%	5120.0%	5060.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2997	2951	2946	2974	2964	2923	2927	2928	2944	3028
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 422.62	$ 416.12	$ 415.39	$ 419.33	$ 417.95	$ 412.09	$ 412.66	$ 412.82	$ 415.16	$ 426.92
Annual savings in carbon tax for electricity [$/year]	$ 1.5	$ 1.48	$ 1.47	$ 1.49	$ 1.48	$ 1.46	$ 1.46	$ 1.46	$ 1.47	$ 1.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 424.12	$ 417.59	$ 416.86	$ 420.82	$ 419.43	$ 413.55	$ 414.13	$ 414.28	$ 416.63	$ 428.43
Annual savings in GHG from electricity savings [kg CO2e/year]	33	32.5	32.4	32.7	32.6	32.1	32.2	32.2	32.4	33.3
Annual savings in natural gas [m3/year]	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63
Annual savings in carbon tax for natural gas [$/year]	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5
Net Present Value [$]	$ 15,642.55	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 16,029.	$ 15,977.41	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,580.13
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	14.09	10.61	14.09	10.61	14.09	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 105.02	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 105.02
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,563.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,959.	$ 1,947.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,555.36	$ 16,686.48	$ 16,742.36	$ 16,895.48	$ 17,082.48	$ 17,027.08	$ 17,171.36	$ 17,346.36	$ 17,407.48	$ 17,423.08
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,763.9	$ 17,904.59	$ 17,964.55	$ 18,128.85	$ 18,329.5	$ 18,270.06	$ 18,424.87	$ 18,612.64	$ 18,678.23	$ 18,694.96
Net Present Value [$]	$ 15,654.99	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 15,977.41	$ 16,029.	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,366.03
Incremental dollars per GHG saving	$ 8.54	$ 8.6	$ 8.63	$ 8.71	$ 8.8	$ 8.78	$ 8.85	$ 8.94	$ 8.97	$ 8.98
Auxiliary Energy Required Heating [GJ/yr]	8.3	8.4	8.4	8	8.2	8.4	8.1	8.2	8.3	8.2
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	3.3	3.3	3.3	3.2	3.2	3.4	3.2	3.2	3.3	3.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	50.2	50.1	50	50.1	50	50.1	50	50	50	50
Design Heating Load [W]	4075.6	3976	4010.2	3985.9	3916.4	4151.7	4015	3976	3893	4096.9
Annual Energy Electricity [kWh/yr]	10701.1	10655	10649.8	10677.8	10626.4	10668	10630.5	10631.6	10648.2	10645.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,450.89	$ 1,444.37	$ 1,443.63	$ 1,447.59	$ 1,440.32	$ 1,446.21	$ 1,440.9	$ 1,441.06	$ 1,443.41	$ 1,442.97
Annual Energy Natural Gas [m3/yr]	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	98691	101067	99771	100635	101715	97395	99339	104433	101913	98043
Upgrade Package List	Pkg3331203034	Pkg3341302034	Pkg3331402034	Pkg3341203034	Pkg3341402034	Pkg3321303034	Pkg3331303034	Pkg4331302034	Pkg3341403033	Pkg3321403034
GHGI [kg/m2]	7.04	7.03	7.03	7.04	7.03	7.03	7.03	7.03	7.03	7.03
% ICC	7.3%	7.4%	7.4%	7.5%	7.6%	7.6%	7.6%	7.7%	7.7%	7.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target MEUI cooling [kWh/(m2 * yr)]	63	63	63	63	63	63	63	63	63	63
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	22.5	22.8	22.9	21.9	22.2	23	22	22.3	22.4	22.4
Output: MEUI [kWh/(m2 * yr)]	62.8	62.4	62.4	62.6	62.2	62.6	62.2	62.2	62.4	62.4
Output: Better than ERS (%)	3330.0%	3350.0%	3360.0%	3350.0%	3360.0%	3350.0%	3360.0%	3360.0%	3360.0%	3360.0%
Output: Better than Envelope (%)	5060.0%	5000.0%	5000.0%	5240.0%	5120.0%	5000.0%	5180.0%	5120.0%	5060.0%	5120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2997	2951	2946	2974	2923	2964	2927	2928	2944	2941
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 422.62	$ 416.12	$ 415.39	$ 419.33	$ 412.09	$ 417.95	$ 412.66	$ 412.82	$ 415.16	$ 414.72
Annual savings in carbon tax for electricity [$/year]	$ 1.5	$ 1.48	$ 1.47	$ 1.49	$ 1.46	$ 1.48	$ 1.46	$ 1.46	$ 1.47	$ 1.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 424.12	$ 417.59	$ 416.86	$ 420.82	$ 413.55	$ 419.43	$ 414.13	$ 414.28	$ 416.63	$ 416.19
Annual savings in GHG from electricity savings [kg CO2e/year]	33	32.5	32.4	32.7	32.1	32.6	32.2	32.2	32.4	32.4
Annual savings in natural gas [m3/year]	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38	38.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63	$ 355.63
Annual savings in carbon tax for natural gas [$/year]	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76	$ 88.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39	$ 444.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5	1972.5
Net Present Value [$]	$ 15,642.55	$ 15,654.99	$ 15,697.54	$ 15,922.6	$ 15,977.41	$ 16,029.	$ 16,076.69	$ 16,254.61	$ 16,358.46	$ 16,366.03
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	10.61	14.09	14.09	10.61	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 105.02	$ 249.3	$ 249.3	$ 589.42	$ 105.02
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,563.	$ 2,959.	$ 1,947.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,959.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 4,903.48	$ 5,047.76	$ 5,099.24	$ 5,133.76	$ 5,189.48	$ 5,203.48	$ 5,243.52	$ 5,313.24	$ 5,333.76	$ 5,347.76
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 5,521.32	$ 5,683.78	$ 5,741.74	$ 5,780.61	$ 5,843.35	$ 5,859.12	$ 5,904.2	$ 5,982.71	$ 6,005.81	$ 6,021.58
Net Present Value [$]	$ 1,196.81	$ 1,174.6	$ 1,006.14	$ 997.68	$ 1,064.8	$ 1,102.82	$ 982.42	$ 1,084.58	$ 1,043.01	$ 1,080.61
Incremental dollars per GHG saving	$ 4.24	$ 4.27	$ 4.43	$ 4.41	$ 4.37	$ 4.33	$ 4.45	$ 4.37	$ 4.39	$ 4.35
Auxiliary Energy Required Heating [GJ/yr]	19.6	19.1	18.3	20.3	19	19.6	17.8	17.1	18.5	19.1
Annual Energy DHW [GJ/yr]	22.6	22.6	24.1	21.7	22.6	21.7	24.1	24.1	22.6	21.7
Annual Energy Space Heating [GJ/yr]	20.8	20.3	19.4	21.5	20.1	20.8	18.9	18.1	19.6	20.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	69.6	69	69.6	69.4	68.9	68.6	69.1	68.3	68.4	68.1
Design Heating Load [W]	7640	7478.2	7567.6	7730.9	7523.6	7640	7405.8	7314.9	7361.8	7478.2
Annual Energy Electricity [kWh/yr]	7365.7	7363.1	7358.8	7369.5	7362.4	7365.7	7356.2	7352.6	7359.8	7363.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 978.93	$ 978.56	$ 977.96	$ 979.47	$ 978.46	$ 978.93	$ 977.59	$ 977.08	$ 978.1	$ 978.56
Annual Energy Natural Gas [m3/yr]	1155.9	1142.1	1157.4	1151	1138.5	1131.3	1143.8	1124.4	1124.7	1117.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 498.61	$ 492.66	$ 499.26	$ 496.5	$ 491.11	$ 488.	$ 493.4	$ 485.03	$ 485.16	$ 482.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11522	13142	6931	3693	11792	11523	8551	17893	13412	13143
Upgrade Package List	Pkg2121101031	Pkg2131101031	Pkg1221102031	Pkg1131102031	Pkg2121102031	Pkg2121101031	Pkg1231102031	Pkg2221101031	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	22.45	22.19	22.48	22.36	22.12	21.99	22.22	21.86	21.86	21.73
% ICC	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53.3	52	49.8	55.2	51.6	53.3	48.5	46.6	50.3	52
Output: MEUI [kWh/(m2 * yr)]	119.4	118	119.5	119	117.6	116.9	118.1	116.1	116.2	115.5
Output: Better than ERS (%)	2000.0%	2070.0%	2000.0%	2020.0%	2080.0%	2110.0%	2060.0%	2150.0%	2140.0%	2170.0%
Output: Better than Envelope (%)	1480.0%	1700.0%	2040.0%	1170.0%	1740.0%	1480.0%	2260.0%	2570.0%	1960.0%	1700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	414	417	421	410	417	414	424	427	420	417
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 58.39	$ 58.75	$ 59.36	$ 57.85	$ 58.85	$ 58.39	$ 59.73	$ 60.24	$ 59.22	$ 58.75
Annual savings in carbon tax for electricity [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 58.6	$ 58.96	$ 59.57	$ 58.06	$ 59.06	$ 58.6	$ 59.94	$ 60.45	$ 59.43	$ 58.96
Annual savings in GHG from electricity savings [kg CO2e/year]	4.6	4.6	4.6	4.5	4.6	4.6	4.7	4.7	4.6	4.6
Annual savings in natural gas [m3/year]	22.39	22.91	22.34	22.58	23.04	23.31	22.84	23.57	23.56	23.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 207.47	$ 212.23	$ 206.95	$ 209.16	$ 213.47	$ 215.96	$ 211.64	$ 218.34	$ 218.24	$ 220.72
Annual savings in carbon tax for natural gas [$/year]	$ 51.78	$ 52.97	$ 51.65	$ 52.21	$ 53.28	$ 53.9	$ 52.83	$ 54.5	$ 54.47	$ 55.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 259.25	$ 265.2	$ 258.6	$ 261.36	$ 266.76	$ 269.86	$ 264.47	$ 272.84	$ 272.71	$ 275.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	1150.7	1177.2	1147.9	1160.1	1184	1197.8	1173.9	1211	1210.5	1224.3
Net Present Value [$]	$ 1,196.81	$ 1,174.6	$ 1,006.14	$ 997.68	$ 1,064.8	$ 1,102.82	$ 982.42	$ 1,084.58	$ 1,043.01	$ 1,080.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	10.61	10.61	8.82	10.61	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	3.87	3.87	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.

SMALL Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,533.76	$ 8,563.24	$ 8,707.52	$ 8,849.24	$ 9,083.76	$ 7,147.76	$ 8,958.22	$ 8,993.52	$ 9,383.76	$ 9,257.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,609.01	$ 9,642.21	$ 9,804.67	$ 9,964.24	$ 10,228.31	$ 8,048.38	$ 10,086.96	$ 10,126.7	$ 10,566.11	$ 10,423.97
Net Present Value [$]	$ 5,143.95	$ 5,446.58	$ 5,450.27	$ 5,585.05	$ 5,426.32	$ 6,602.17	$ 5,676.87	$ 5,572.86	$ 5,552.05	$ 5,732.64
Incremental dollars per GHG saving	$ 3.29	$ 3.3	$ 3.35	$ 3.41	$ 3.42	$ 3.42	$ 3.45	$ 3.46	$ 3.48	$ 3.48
Auxiliary Energy Required Heating [GJ/yr]	20.9	21.4	20.8	20.7	20.9	21	20.8	20.2	20.9	20.9
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	24	14.3	14.3	12.3	13
Annual Energy Space Heating [GJ/yr]	8.7	8.9	8.7	8.7	8.7	8.9	8.6	8.5	8.7	8.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	53.6	54	53.8	53.8	52.4	64.3	53.8	53.6	51.6	52.6
Design Heating Load [W]	7192.1	7523.1	7361.3	7406.7	7192.1	7924	7549.8	7244.9	7192.1	7361.3
Annual Energy Electricity [kWh/yr]	10934.2	11040.3	10985.7	10983	10935.3	11183	10976.3	10922.2	10936	10986.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,483.87	$ 1,498.89	$ 1,491.16	$ 1,490.78	$ 1,484.03	$ 1,519.08	$ 1,489.83	$ 1,482.18	$ 1,484.13	$ 1,491.32
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	350.4	645.8	382.7	382.7	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 278.58	$ 165.08	$ 165.08	$ 142.09	$ 151.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13423	6673	8293	6943	13424	3430	14773	8563	13425	8294
Upgrade Package List	Pkg2131102031	Pkg1221101031	Pkg1231101031	Pkg1221102031	Pkg2131102031	Pkg1131101031	Pkg2211101031	Pkg1231102031	Pkg2131102031	Pkg1231101031
GHGI [kg/m2]	8.35	8.36	8.35	8.35	7.74	13.3	8.35	8.35	7.35	7.75
% ICC	3.8%	3.8%	3.9%	3.9%	4.0%	3.2%	4.0%	4.0%	4.2%	4.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	56.9	58	56.6	56.3	56.9	57	56.5	54.9	56.9	56.7
Output: MEUI [kWh/(m2 * yr)]	73.9	74.8	74.3	74.3	70.6	102.6	74.2	73.7	68.5	71
Output: Better than ERS (%)	3810.0%	3760.0%	3790.0%	3790.0%	3950.0%	3030.0%	3790.0%	3810.0%	4040.0%	3930.0%
Output: Better than Envelope (%)	910.0%	700.0%	960.0%	1000.0%	910.0%	870.0%	960.0%	1220.0%	910.0%	910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3154	3260	3206	3203	3156	3403	3196	3142	3156	3207
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 444.77	$ 459.73	$ 452.03	$ 451.65	$ 444.93	$ 479.85	$ 450.71	$ 443.08	$ 445.02	$ 452.19
Annual savings in carbon tax for electricity [$/year]	$ 1.58	$ 1.63	$ 1.6	$ 1.6	$ 1.58	$ 1.7	$ 1.6	$ 1.57	$ 1.58	$ 1.6
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 446.35	$ 461.36	$ 453.63	$ 453.25	$ 446.5	$ 481.55	$ 452.3	$ 444.65	$ 446.6	$ 453.79
Annual savings in GHG from electricity savings [kg CO2e/year]	34.7	35.9	35.3	35.2	34.7	37.4	35.2	34.6	34.7	35.3
Annual savings in natural gas [m3/year]	51.2	51.2	51.2	51.2	52.4	41.4	51.2	51.2	53.19	52.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 485.53	$ 383.56	$ 474.38	$ 474.38	$ 492.78	$ 485.53
Annual savings in carbon tax for natural gas [$/year]	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 121.19	$ 95.73	$ 118.4	$ 118.4	$ 123.	$ 121.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 606.72	$ 479.29	$ 592.78	$ 592.78	$ 615.77	$ 606.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	2631.2	2631.2	2631.2	2631.2	2693	2127.4	2631.2	2631.2	2733.2	2693
Net Present Value [$]	$ 5,143.95	$ 5,446.58	$ 5,450.27	$ 5,585.05	$ 5,426.32	$ 6,602.17	$ 5,676.87	$ 5,572.86	$ 5,552.05	$ 5,732.64
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	8.82	8.82	10.61	10.61	8.82	8.82	10.61	10.61	8.82
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 682.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	5.28	3.87	3.87	5.28	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$.	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.

SMALL Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 5,383.76	$ 5,413.24	$ 5,557.52	$ 5,913.24	$ 6,057.52	$ 5,699.24	$ 5,843.52	$ 5,933.76	$ 6,199.24	$ 6,343.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 6,062.11	$ 6,095.31	$ 6,257.77	$ 6,658.31	$ 6,820.77	$ 6,417.34	$ 6,579.8	$ 6,681.41	$ 6,980.34	$ 7,142.8
Net Present Value [$]	$ 2,281.11	$ 2,142.48	$ 2,125.74	$ 2,110.57	$ 2,092.13	$ 2,016.9	$ 1,999.43	$ 1,997.9	$ 1,983.29	$ 1,963.69
Incremental dollars per GHG saving	$ 3.55	$ 3.63	$ 3.65	$ 3.71	$ 3.74	$ 3.73	$ 3.76	$ 3.76	$ 3.81	$ 3.83
Auxiliary Energy Required Heating [GJ/yr]	20.9	21.4	20.8	19.5	19	20.7	20.2	20.9	18.8	18.3
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	14.3	14.3	14.3	13	14.3	14.3
Annual Energy Space Heating [GJ/yr]	22.2	22.6	22.1	20.6	20.1	21.9	21.4	22.2	19.9	19.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	62.6	63	62.5	61	60.5	62.3	61.8	61.4	60.3	59.8
Design Heating Load [W]	7125	7448.7	7286.9	7078.2	6916.3	7332.3	7170.5	7125	6961.7	6799.9
Annual Energy Electricity [kWh/yr]	7372.6	7374.9	7372.2	7364.9	7362.2	7371.5	7368.8	7372.7	7361.5	7358.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 979.91	$ 980.23	$ 979.85	$ 978.82	$ 978.44	$ 979.75	$ 979.37	$ 979.92	$ 978.34	$ 977.97
Annual Energy Natural Gas [m3/yr]	967	979.3	964.9	926.5	912.3	961.2	946.9	935.1	908.6	894.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 417.13	$ 422.44	$ 416.22	$ 399.66	$ 393.53	$ 414.63	$ 408.46	$ 403.37	$ 391.94	$ 385.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13414	6664	8284	17896	21028	6934	8554	13415	18166	21298
Upgrade Package List	Pkg2131102031	Pkg1221101031	Pkg1231101031	Pkg2221101031	Pkg2231101031	Pkg1221102031	Pkg1231102031	Pkg2131102031	Pkg2221102031	Pkg2231102031
GHGI [kg/m2]	18.91	19.14	18.87	18.15	17.88	18.8	18.53	18.31	17.81	17.55
% ICC	2.4%	2.4%	2.5%	2.6%	2.7%	2.5%	2.6%	2.6%	2.7%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	118	118	118	118	118	118	118	118	118	118
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.9	58	56.6	52.9	51.5	56.3	54.9	56.9	51.2	49.8
Output: MEUI [kWh/(m2 * yr)]	100.4	101.6	100.2	96.2	94.7	99.8	98.3	97.1	94.4	92.9
Output: Better than ERS (%)	2390.0%	2350.0%	2410.0%	2590.0%	2650.0%	2430.0%	2490.0%	2540.0%	2670.0%	2730.0%
Output: Better than Envelope (%)	910.0%	700.0%	960.0%	1520.0%	1740.0%	1000.0%	1220.0%	910.0%	1830.0%	2040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	407	405	408	415	418	408	411	407	418	421
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 57.42	$ 57.09	$ 57.47	$ 58.5	$ 58.88	$ 57.57	$ 57.95	$ 57.4	$ 58.98	$ 59.35
Annual savings in carbon tax for electricity [$/year]	$ .2	$ .2	$ .2	$ .21	$ .21	$ .2	$ .21	$ .2	$ .21	$ .21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 57.62	$ 57.29	$ 57.68	$ 58.71	$ 59.09	$ 57.77	$ 58.16	$ 57.6	$ 59.19	$ 59.56
Annual savings in GHG from electricity savings [kg CO2e/year]	4.5	4.5	4.5	4.6	4.6	4.5	4.5	4.5	4.6	4.6
Annual savings in natural gas [m3/year]	29.43	28.97	29.51	30.94	31.47	29.65	30.18	30.62	31.61	32.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 272.68	$ 268.43	$ 273.4	$ 286.66	$ 291.56	$ 274.68	$ 279.62	$ 283.69	$ 292.84	$ 297.7
Annual savings in carbon tax for natural gas [$/year]	$ 68.06	$ 67.	$ 68.24	$ 71.55	$ 72.77	$ 68.56	$ 69.79	$ 70.81	$ 73.09	$ 74.31
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 340.74	$ 335.43	$ 341.64	$ 358.21	$ 364.33	$ 343.24	$ 349.41	$ 354.5	$ 365.93	$ 372.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	1512.4	1488.9	1516.4	1590	1617.2	1523.5	1550.9	1573.5	1624.2	1651.2
Net Present Value [$]	$ 2,281.11	$ 2,142.48	$ 2,125.74	$ 2,110.57	$ 2,092.13	$ 2,016.9	$ 1,999.43	$ 1,997.9	$ 1,983.29	$ 1,963.69
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	8.82	8.82	8.82	8.82	10.61	10.61	10.61	10.61	10.61
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 682.	$ 396.	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	5.28	5.28	5.28	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

SMALL Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,313.24	$ 9,365.14	$ 9,457.52	$ 9,493.52	$ 9,509.42	$ 9,599.24	$ 9,651.14	$ 9,743.52	$ 9,795.42	$ 10,043.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 10,486.71	$ 10,545.15	$ 10,649.17	$ 10,689.7	$ 10,707.61	$ 10,808.74	$ 10,867.18	$ 10,971.2	$ 11,029.64	$ 11,309.
Net Present Value [$]	$ 7,433.4	$ 7,209.78	$ 7,423.4	$ 5,612.74	$ 7,191.38	$ 7,632.13	$ 7,331.09	$ 7,636.37	$ 7,323.64	$ 5,893.83
Incremental dollars per GHG saving	$ 4.21	$ 4.23	$ 4.27	$ 3.65	$ 4.29	$ 4.34	$ 4.36	$ 4.4	$ 4.42	$ 3.78
Auxiliary Energy Required Heating [GJ/yr]	17.1	18.3	16.6	18.3	17.8	16.5	17.7	16	17.2	18.3
Annual Energy DHW [GJ/yr]	21.7	21.7	21.7	14.3	21.7	21.7	21.7	21.7	21.7	13
Annual Energy Space Heating [GJ/yr]	7.3	7.7	7.1	7.7	7.5	7.1	7.5	6.9	7.3	7.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	60.8	60.5	60.6	52.9	60.2	60.7	60.2	60.5	60	51.7
Design Heating Load [W]	7387.4	7387.4	7225.6	6867	7225.6	7271	7271	7109.2	7109.2	6867
Annual Energy Electricity [kWh/yr]	10868	10761	10808.1	10743.5	10697.8	10834.1	10697	10779.7	10638.1	10744.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,474.51	$ 1,459.37	$ 1,466.03	$ 1,456.89	$ 1,450.42	$ 1,469.71	$ 1,450.31	$ 1,462.01	$ 1,441.98	$ 1,456.98
Annual Energy Natural Gas [m3/yr]	583.3	583.3	583.3	382.7	583.3	583.3	583.3	583.3	583.3	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 251.62	$ 251.62	$ 251.62	$ 165.08	$ 251.62	$ 251.62	$ 251.62	$ 251.62	$ 251.62	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17904	17850	21036	21307	20982	18174	18120	21306	21252	21308
Upgrade Package List	Pkg2221101031	Pkg2221101021	Pkg2231101031	Pkg2231102031	Pkg2231101021	Pkg2221102031	Pkg2221102021	Pkg2231102031	Pkg2231102021	Pkg2231102031
GHGI [kg/m2]	12.1	12.09	8.33	8.33	12.08	12.09	12.08	12.09	12.07	7.72
% ICC	4.1%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.3%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.6	49.8	45.2	49.8	48.5	44.9	48.1	43.6	46.8	49.8
Output: MEUI [kWh/(m2 * yr)]	93	92.4	92.4	71.9	91.8	92.6	91.7	92.1	91.2	68.6
Output: Better than ERS (%)	3410.0%	3450.0%	3430.0%	3890.0%	3480.0%	3420.0%	3480.0%	3450.0%	3500.0%	4030.0%
Output: Better than Envelope (%)	2570.0%	2040.0%	2780.0%	2040.0%	2260.0%	2830.0%	2300.0%	3040.0%	2520.0%	2040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3088	2981	3028	2964	2918	3054	2917	3000	2858	2964
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 435.44	$ 420.35	$ 426.99	$ 417.88	$ 411.44	$ 430.66	$ 411.33	$ 422.99	$ 403.02	$ 417.97
Annual savings in carbon tax for electricity [$/year]	$ 1.54	$ 1.49	$ 1.51	$ 1.48	$ 1.46	$ 1.53	$ 1.46	$ 1.5	$ 1.43	$ 1.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 436.98	$ 421.84	$ 428.5	$ 419.36	$ 412.9	$ 432.18	$ 412.78	$ 424.49	$ 404.45	$ 419.45
Annual savings in GHG from electricity savings [kg CO2e/year]	34	32.8	33.3	32.6	32.1	33.6	32.1	33	31.4	32.6
Annual savings in natural gas [m3/year]	43.73	43.73	43.73	51.2	43.73	43.73	43.73	43.73	43.73	52.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 405.13	$ 405.13	$ 405.13	$ 474.38	$ 405.13	$ 405.13	$ 405.13	$ 405.13	$ 405.13	$ 485.53
Annual savings in carbon tax for natural gas [$/year]	$ 101.12	$ 101.12	$ 101.12	$ 118.4	$ 101.12	$ 101.12	$ 101.12	$ 101.12	$ 101.12	$ 121.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 506.25	$ 506.25	$ 506.25	$ 592.78	$ 506.25	$ 506.25	$ 506.25	$ 506.25	$ 506.25	$ 606.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	2247.1	2247.1	2247.1	2631.2	2247.1	2247.1	2247.1	2247.1	2247.1	2693
Net Present Value [$]	$ 7,433.4	$ 7,209.78	$ 7,423.4	$ 5,612.74	$ 7,191.38	$ 7,632.13	$ 7,331.09	$ 7,636.37	$ 7,323.64	$ 5,893.83
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	8.82	10.61	10.61	10.61	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.

SMALL Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,493.52	$ 10,043.52	$ 10,343.52	$ 10,853.52	$ 10,863.24	$ 9,313.24	$ 9,365.14	$ 11,007.52	$ 9,457.52	$ 11,403.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 10,689.7	$ 11,309.	$ 11,646.8	$ 12,221.06	$ 12,232.01	$ 10,486.71	$ 10,545.15	$ 12,394.47	$ 10,649.17	$ 12,840.36
Net Present Value [$]	$ 5,612.74	$ 5,893.83	$ 6,019.56	$ 7,801.31	$ 7,712.07	$ 7,433.4	$ 7,209.78	$ 7,757.57	$ 7,423.4	$ 8,083.5
Incremental dollars per GHG saving	$ 3.65	$ 3.78	$ 3.83	$ 4.18	$ 4.19	$ 4.21	$ 4.23	$ 4.24	$ 4.27	$ 4.29
Auxiliary Energy Required Heating [GJ/yr]	18.3	18.3	18.3	18.4	18.1	17.1	18.3	17.6	16.6	18.4
Annual Energy DHW [GJ/yr]	14.3	13	12.3	14.3	14.3	21.7	21.7	14.3	21.7	13
Annual Energy Space Heating [GJ/yr]	7.7	7.7	7.7	7.7	7.6	7.3	7.7	7.4	7.1	7.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	1.5	1.5	0.5	0.5	1.5	0.5	1.5
Total Energy [GJ/yr]	52.9	51.7	50.9	54.1	53.9	60.8	60.5	53.8	60.6	52.9
Design Heating Load [W]	6867	6867	6867	6170	6270.8	7387.4	7387.4	6109	7225.6	6170
Annual Energy Electricity [kWh/yr]	10743.5	10744.1	10744.8	11065.3	11026.9	10868	10761	10988.5	10808.1	11066.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,456.89	$ 1,456.98	$ 1,457.07	$ 1,502.42	$ 1,496.99	$ 1,474.51	$ 1,459.37	$ 1,491.56	$ 1,466.03	$ 1,502.58
Annual Energy Natural Gas [m3/yr]	382.7	350.4	329.4	382.7	382.7	583.3	583.3	382.7	583.3	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 142.09	$ 165.08	$ 165.08	$ 251.62	$ 251.62	$ 165.08	$ 251.62	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21307	21308	21309	21325	17941	17904	17850	21073	21036	21326
Upgrade Package List	Pkg2231102031	Pkg2231102031	Pkg2231102031	Pkg2231102032	Pkg2221101033	Pkg2221101031	Pkg2221101021	Pkg2231101033	Pkg2231101031	Pkg2231102032
GHGI [kg/m2]	8.33	7.72	7.33	8.36	8.36	12.1	12.09	8.35	12.09	7.76
% ICC	4.2%	4.5%	4.6%	4.8%	4.8%	4.1%	4.2%	4.9%	4.2%	5.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	49.8	49.8	49.9	50.1	49.3	46.6	49.8	47.9	45.2	50.1
Output: MEUI [kWh/(m2 * yr)]	71.9	68.6	66.5	74.9	74.5	93	92.4	74.1	92.4	71.6
Output: Better than ERS (%)	3890.0%	4030.0%	4120.0%	3750.0%	3780.0%	3410.0%	3450.0%	3790.0%	3430.0%	3890.0%
Output: Better than Envelope (%)	2040.0%	2040.0%	2040.0%	2000.0%	2130.0%	2570.0%	2040.0%	2350.0%	2780.0%	2000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2964	2964	2965	3286	3247	3088	2981	3209	3028	3287
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 417.88	$ 417.97	$ 418.06	$ 463.26	$ 457.84	$ 435.44	$ 420.35	$ 452.43	$ 426.99	$ 463.41
Annual savings in carbon tax for electricity [$/year]	$ 1.48	$ 1.48	$ 1.48	$ 1.64	$ 1.62	$ 1.54	$ 1.49	$ 1.6	$ 1.51	$ 1.64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 419.36	$ 419.45	$ 419.55	$ 464.9	$ 459.46	$ 436.98	$ 421.84	$ 454.03	$ 428.5	$ 465.05
Annual savings in GHG from electricity savings [kg CO2e/year]	32.6	32.6	32.6	36.1	35.7	34	32.8	35.3	33.3	36.2
Annual savings in natural gas [m3/year]	51.2	52.4	53.19	51.2	51.2	43.73	43.73	51.2	43.73	52.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 474.38	$ 485.53	$ 492.78	$ 474.38	$ 474.38	$ 405.13	$ 405.13	$ 474.38	$ 405.13	$ 485.53
Annual savings in carbon tax for natural gas [$/year]	$ 118.4	$ 121.19	$ 123.	$ 118.4	$ 118.4	$ 101.12	$ 101.12	$ 118.4	$ 101.12	$ 121.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 592.78	$ 606.72	$ 615.77	$ 592.78	$ 592.78	$ 506.25	$ 506.25	$ 592.78	$ 506.25	$ 606.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	2631.2	2693	2733.2	2631.2	2631.2	2247.1	2247.1	2631.2	2247.1	2693
Net Present Value [$]	$ 5,612.74	$ 5,893.83	$ 6,019.56	$ 7,801.31	$ 7,712.07	$ 7,433.4	$ 7,209.78	$ 7,757.57	$ 7,423.4	$ 8,083.5
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	10.61	10.61	10.61	8.82	8.82	8.82	8.82	8.82	10.61
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.	$ 396.	$ 396.	$ 396.	$ 396.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 60	HRV sre 75	NA	NA	HRV sre 75	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,360.	$ 1,800.	$.	$.	$ 1,800.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 850.	$ 850.	$.	$ 850.	$ 550.

SMALL Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,745.48	$ 13,932.48	$ 14,021.36	$ 14,196.36	$ 14,361.48	$ 14,417.36	$ 14,408.71	$ 14,408.71	$ 14,536.48	$ 14,457.48
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 15,477.41	$ 15,687.97	$ 15,788.05	$ 15,985.1	$ 16,171.03	$ 16,233.95	$ 16,224.21	$ 16,224.21	$ 16,368.08	$ 16,279.12
Net Present Value [$]	$ 4,329.29	$ 4,556.88	$ 4,614.94	$ 4,810.99	$ 4,875.21	$ 4,938.8	$ 4,971.1	$ 4,978.44	$ 5,072.23	$ 5,072.56
Incremental dollars per GHG saving	$ 6.72	$ 6.85	$ 6.87	$ 6.97	$ 6.97	$ 7.01	$ 7.03	$ 7.04	$ 7.08	$ 7.1
Auxiliary Energy Required Heating [GJ/yr]	12.9	13.1	13	13.1	12.6	12.7	12.8	12.9	12.7	12.3
Annual Energy DHW [GJ/yr]	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	13
Annual Energy Space Heating [GJ/yr]	13.7	13.9	13.7	13.8	13.4	13.4	13.6	13.6	13.5	13.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	53	53.2	53.1	53.2	52.7	52.8	52.9	53	52.8	53.2
Design Heating Load [W]	4979.5	4913	5032.4	4969	4910.6	4968.9	4948.1	5088.6	4847.2	4844.6
Annual Energy Electricity [kWh/yr]	7592.2	7593	7592.4	7592.8	7590.7	7590.8	7591.7	7591.9	7591.1	7589.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,010.98	$ 1,011.09	$ 1,011.01	$ 1,011.07	$ 1,010.77	$ 1,010.78	$ 1,010.91	$ 1,010.94	$ 1,010.83	$ 1,010.54
Annual Energy Natural Gas [m3/yr]	690.4	695	691.5	693.9	682.5	683.4	688	688.8	685	695.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 297.81	$ 299.8	$ 298.29	$ 299.32	$ 294.41	$ 294.79	$ 296.78	$ 297.12	$ 295.49	$ 299.84
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	47850	48930	46554	51648	48498	47202	45780	30246	52224	49145
Upgrade Package List	Pkg3341203034	Pkg3341402034	Pkg3331303034	Pkg4331302034	Pkg3341303034	Pkg3331403034	Pkg3331202053	Pkg2331202054	Pkg4341302034	Pkg3341403034
GHGI [kg/m2]	13.75	13.84	13.77	13.82	13.6	13.62	13.71	13.72	13.65	13.84
% ICC	6.1%	6.2%	6.2%	6.3%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	93	93	93	93	93	93	93	93	93	93
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	35.1	35.6	35.2	35.5	34.4	34.4	34.9	35	34.6	33.5
Output: MEUI [kWh/(m2 * yr)]	74.5	75	74.6	74.9	73.7	73.8	74.3	74.4	74	75
Output: Better than ERS (%)	3560.0%	3540.0%	3550.0%	3540.0%	3600.0%	3580.0%	3570.0%	3560.0%	3580.0%	3540.0%
Output: Better than Envelope (%)	4390.0%	4300.0%	4350.0%	4300.0%	4520.0%	4480.0%	4430.0%	4390.0%	4480.0%	4650.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	188	187	187	187	189	189	188	188	189	191
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 26.45	$ 26.34	$ 26.42	$ 26.37	$ 26.66	$ 26.65	$ 26.52	$ 26.49	$ 26.61	$ 26.89
Annual savings in carbon tax for electricity [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 26.55	$ 26.43	$ 26.52	$ 26.46	$ 26.76	$ 26.74	$ 26.62	$ 26.59	$ 26.7	$ 26.98
Annual savings in GHG from electricity savings [kg CO2e/year]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Annual savings in natural gas [m3/year]	39.74	39.57	39.7	39.61	40.03	40	39.83	39.8	39.94	39.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 368.16	$ 366.57	$ 367.78	$ 366.95	$ 370.89	$ 370.58	$ 368.99	$ 368.71	$ 370.02	$ 366.54
Annual savings in carbon tax for natural gas [$/year]	$ 91.89	$ 91.49	$ 91.8	$ 91.59	$ 92.57	$ 92.49	$ 92.1	$ 92.03	$ 92.36	$ 91.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 460.05	$ 458.07	$ 459.58	$ 458.54	$ 463.46	$ 463.07	$ 461.09	$ 460.74	$ 462.38	$ 458.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	2042	2033.2	2039.9	2035.3	2057.1	2055.4	2046.6	2045.1	2052.4	2033
Net Present Value [$]	$ 4,329.29	$ 4,556.88	$ 4,614.94	$ 4,810.99	$ 4,875.21	$ 4,938.8	$ 4,971.1	$ 4,978.44	$ 5,072.23	$ 5,072.56
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	14.09	10.61	14.09	14.09	10.61	10.61	10.61	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 682.	$ 682.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66	$ 2,864.66	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 249.3	$ 249.3	$ 249.3	$ 589.42	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR10	BC EffR10	BC EffR14	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,563.	$ 2,959.	$ 1,947.	$ 1,947.	$ 2,563.	$ 2,959.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.

SMALL Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,033.71	$ 18,164.83	$ 18,220.71	$ 18,373.83	$ 18,489.83	$ 18,505.43	$ 18,545.71	$ 18,560.83	$ 18,583.71	$ 18,649.71
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 20,305.96	$ 20,453.6	$ 20,516.52	$ 20,688.93	$ 20,819.55	$ 20,837.11	$ 20,882.47	$ 20,899.49	$ 20,925.26	$ 20,999.57
Net Present Value [$]	$ 13,503.11	$ 13,547.87	$ 13,695.59	$ 13,764.72	$ 13,942.07	$ 13,975.38	$ 13,981.88	$ 13,955.19	$ 13,784.93	$ 14,039.14
Incremental dollars per GHG saving	$ 6.93	$ 6.98	$ 7.	$ 7.06	$ 7.11	$ 7.11	$ 7.13	$ 7.13	$ 6.98	$ 7.17
Auxiliary Energy Required Heating [GJ/yr]	11.3	11.4	11.4	11	11.5	11.5	11.5	11.1	11.3	11
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	13	14.3
Annual Energy Space Heating [GJ/yr]	4.9	4.9	4.9	4.8	5	5	5	4.8	4.9	4.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	52	51.9	52	51.9	52	52	52	51.9	50.8	51.9
Design Heating Load [W]	4900.2	4780.3	4838.6	4780.9	4749.9	5014.5	4808.3	4714.3	4900.2	4833.7
Annual Energy Electricity [kWh/yr]	10491.1	10457.5	10493.2	10460.6	10484.4	10491.3	10478.2	10461.9	10492	10460
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,421.18	$ 1,416.42	$ 1,421.47	$ 1,416.86	$ 1,420.23	$ 1,421.2	$ 1,419.35	$ 1,417.04	$ 1,421.3	$ 1,416.78
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	382.7	382.7	382.7	382.7	350.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	46021	48397	47101	47965	48595	44725	47299	49045	46022	46669
Upgrade Package List	Pkg3331203054	Pkg3341302054	Pkg3331402054	Pkg3341203054	Pkg3341303053	Pkg3321303054	Pkg3331403053	Pkg3341402054	Pkg3331203054	Pkg3331303054
GHGI [kg/m2]	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.69	8.3
% ICC	8.0%	8.1%	8.1%	8.1%	8.2%	8.2%	8.2%	8.2%	8.2%	8.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	73	73	73	73	73	73	73	73	73	73
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	30.6	31	31.1	29.8	31.2	31.2	31.3	30.2	30.6	29.9
Output: MEUI [kWh/(m2 * yr)]	68.9	68.6	69	68.6	68.9	69	68.8	68.7	65.6	68.7
Output: Better than ERS (%)	4000.0%	4010.0%	4000.0%	4010.0%	4000.0%	4000.0%	4000.0%	4010.0%	4130.0%	4010.0%
Output: Better than Envelope (%)	5090.0%	5040.0%	5040.0%	5220.0%	5000.0%	5000.0%	5000.0%	5170.0%	5090.0%	5220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2711	2678	2713	2681	2705	2712	2698	2682	2712	2680
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 382.29	$ 377.56	$ 382.59	$ 377.99	$ 381.35	$ 382.32	$ 380.47	$ 378.18	$ 382.42	$ 377.91
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.34	$ 1.36	$ 1.34	$ 1.35	$ 1.36	$ 1.35	$ 1.34	$ 1.36	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 383.65	$ 378.89	$ 383.95	$ 379.33	$ 382.7	$ 383.68	$ 381.82	$ 379.52	$ 383.78	$ 379.25
Annual savings in GHG from electricity savings [kg CO2e/year]	29.8	29.5	29.8	29.5	29.8	29.8	29.7	29.5	29.8	29.5
Annual savings in natural gas [m3/year]	51.2	51.2	51.2	51.2	51.2	51.2	51.2	51.2	52.4	51.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 485.53	$ 474.38
Annual savings in carbon tax for natural gas [$/year]	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 121.19	$ 118.4
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 606.72	$ 592.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	2631.2	2631.2	2631.2	2631.2	2631.2	2631.2	2631.2	2631.2	2693	2631.2
Net Present Value [$]	$ 13,503.11	$ 13,547.87	$ 13,695.59	$ 13,764.72	$ 13,942.07	$ 13,975.38	$ 13,981.88	$ 13,955.19	$ 13,784.93	$ 14,039.14
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	14.09	14.09	14.09	10.61	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 1,507.	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 105.02	$ 249.3	$ 589.42	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,563.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,959.	$ 1,947.	$ 2,563.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

SMALL Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,033.71	$ 18,583.71	$ 18,164.83	$ 18,883.71	$ 18,220.71	$ 18,714.83	$ 19,014.83	$ 18,770.71	$ 19,070.71	$ 18,373.83
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 20,305.96	$ 20,925.26	$ 20,453.6	$ 21,263.06	$ 20,516.52	$ 21,072.9	$ 21,410.7	$ 21,135.82	$ 21,473.62	$ 20,688.93
Net Present Value [$]	$ 13,503.11	$ 13,784.93	$ 13,547.87	$ 13,910.48	$ 13,695.59	$ 13,829.33	$ 13,954.87	$ 13,977.05	$ 14,102.77	$ 13,764.72
Incremental dollars per GHG saving	$ 6.93	$ 6.98	$ 6.98	$ 6.99	$ 7.	$ 7.03	$ 7.03	$ 7.05	$ 7.06	$ 7.06
Auxiliary Energy Required Heating [GJ/yr]	11.3	11.3	11.4	11.3	11.4	11.4	11.4	11.5	11.5	11
Annual Energy DHW [GJ/yr]	14.3	13	14.3	12.3	14.3	13	12.3	13	12.3	14.3
Annual Energy Space Heating [GJ/yr]	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	52	50.8	51.9	50	52	50.7	49.9	50.8	50	51.9
Design Heating Load [W]	4900.2	4900.2	4780.3	4900.2	4838.6	4780.3	4780.3	4838.6	4838.6	4780.9
Annual Energy Electricity [kWh/yr]	10491.1	10492	10457.5	10492.6	10493.2	10458.3	10458.9	10494	10494.6	10460.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,421.18	$ 1,421.3	$ 1,416.42	$ 1,421.39	$ 1,421.47	$ 1,416.53	$ 1,416.62	$ 1,421.59	$ 1,421.67	$ 1,416.86
Annual Energy Natural Gas [m3/yr]	382.7	350.4	382.7	329.4	382.7	350.4	329.4	350.4	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 165.08	$ 151.15	$ 142.09	$ 151.15	$ 142.09	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	46021	46022	48397	46023	47101	48398	48399	47102	47103	47965
Upgrade Package List	Pkg3331203054	Pkg3331203054	Pkg3341302054	Pkg3331203054	Pkg3331402054	Pkg3341302054	Pkg3341302054	Pkg3331402054	Pkg3331402054	Pkg3341203054
GHGI [kg/m2]	8.3	7.69	8.3	7.3	8.3	7.69	7.3	7.69	7.3	8.3
% ICC	8.0%	8.2%	8.1%	8.4%	8.1%	8.3%	8.4%	8.3%	8.5%	8.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	73	73	73	73	73	73	73	73	73	73
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	30.6	30.6	31	30.7	31.1	31	31.1	31.1	31.2	29.8
Output: MEUI [kWh/(m2 * yr)]	68.9	65.6	68.6	63.5	69	65.4	63.3	65.7	63.6	68.6
Output: Better than ERS (%)	4000.0%	4130.0%	4010.0%	4230.0%	4000.0%	4150.0%	4240.0%	4130.0%	4230.0%	4010.0%
Output: Better than Envelope (%)	5090.0%	5090.0%	5040.0%	5090.0%	5040.0%	5040.0%	5040.0%	5000.0%	5000.0%	5220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2711	2712	2678	2713	2713	2678	2679	2714	2715	2681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 382.29	$ 382.42	$ 377.56	$ 382.5	$ 382.59	$ 377.67	$ 377.75	$ 382.7	$ 382.79	$ 377.99
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.36	$ 1.34	$ 1.36	$ 1.36	$ 1.34	$ 1.34	$ 1.36	$ 1.36	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 383.65	$ 383.78	$ 378.89	$ 383.86	$ 383.95	$ 379.01	$ 379.09	$ 384.06	$ 384.14	$ 379.33
Annual savings in GHG from electricity savings [kg CO2e/year]	29.8	29.8	29.5	29.8	29.8	29.5	29.5	29.9	29.9	29.5
Annual savings in natural gas [m3/year]	51.2	52.4	51.2	53.19	51.2	52.4	53.19	52.4	53.19	51.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 474.38	$ 485.53	$ 474.38	$ 492.78	$ 474.38	$ 485.53	$ 492.78	$ 485.53	$ 492.78	$ 474.38
Annual savings in carbon tax for natural gas [$/year]	$ 118.4	$ 121.19	$ 118.4	$ 123.	$ 118.4	$ 121.19	$ 123.	$ 121.19	$ 123.	$ 118.4
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 592.78	$ 606.72	$ 592.78	$ 615.77	$ 592.78	$ 606.72	$ 615.77	$ 606.72	$ 615.77	$ 592.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	2631.2	2693	2631.2	2733.2	2631.2	2693	2733.2	2693	2733.2	2631.2
Net Present Value [$]	$ 13,503.11	$ 13,784.93	$ 13,547.87	$ 13,910.48	$ 13,695.59	$ 13,829.33	$ 13,954.87	$ 13,977.05	$ 14,102.77	$ 13,764.72
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.61	14.09	10.61	10.61	10.61	10.61	10.61	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 1,947.	$ 2,563.	$ 1,947.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,959.	$ 1,947.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

SMALL Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,033.71	$ 18,164.83	$ 18,220.71	$ 18,373.83	$ 18,583.71	$ 18,714.83	$ 18,883.71	$ 18,489.83	$ 19,014.83	$ 18,560.83
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 20,305.96	$ 20,453.6	$ 20,516.52	$ 20,688.93	$ 20,925.26	$ 21,072.9	$ 21,263.06	$ 20,819.55	$ 21,410.7	$ 20,899.49
Net Present Value [$]	$ 13,503.11	$ 13,547.87	$ 13,695.59	$ 13,764.72	$ 13,784.93	$ 13,829.33	$ 13,910.48	$ 13,942.07	$ 13,954.87	$ 13,955.19
Incremental dollars per GHG saving	$ 6.93	$ 6.98	$ 7.	$ 7.06	$ 6.98	$ 7.03	$ 6.99	$ 7.11	$ 7.03	$ 7.13
Auxiliary Energy Required Heating [GJ/yr]	11.3	11.4	11.4	11	11.3	11.4	11.3	11.5	11.4	11.1
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	13	12.3	14.3	12.3	14.3
Annual Energy Space Heating [GJ/yr]	4.9	4.9	4.9	4.8	4.9	4.9	4.9	5	4.9	4.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	52	51.9	52	51.9	50.8	50.7	50	52	49.9	51.9
Design Heating Load [W]	4900.2	4780.3	4838.6	4780.9	4900.2	4780.3	4900.2	4749.9	4780.3	4714.3
Annual Energy Electricity [kWh/yr]	10491.1	10457.5	10493.2	10460.6	10492	10458.3	10492.6	10484.4	10458.9	10461.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,421.18	$ 1,416.42	$ 1,421.47	$ 1,416.86	$ 1,421.3	$ 1,416.53	$ 1,421.39	$ 1,420.23	$ 1,416.62	$ 1,417.04
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	350.4	350.4	329.4	382.7	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 151.15	$ 142.09	$ 165.08	$ 142.09	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	46021	48397	47101	47965	46022	48398	46023	48595	48399	49045
Upgrade Package List	Pkg3331203054	Pkg3341302054	Pkg3331402054	Pkg3341203054	Pkg3331203054	Pkg3341302054	Pkg3331203054	Pkg3341303053	Pkg3341302054	Pkg3341402054
GHGI [kg/m2]	8.3	8.3	8.3	8.3	7.69	7.69	7.3	8.3	7.3	8.3
% ICC	8.0%	8.1%	8.1%	8.1%	8.2%	8.3%	8.4%	8.2%	8.4%	8.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	73	73	73	73	73	73	73	73	73	73
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	30.6	31	31.1	29.8	30.6	31	30.7	31.2	31.1	30.2
Output: MEUI [kWh/(m2 * yr)]	68.9	68.6	69	68.6	65.6	65.4	63.5	68.9	63.3	68.7
Output: Better than ERS (%)	4000.0%	4010.0%	4000.0%	4010.0%	4130.0%	4150.0%	4230.0%	4000.0%	4240.0%	4010.0%
Output: Better than Envelope (%)	5090.0%	5040.0%	5040.0%	5220.0%	5090.0%	5040.0%	5090.0%	5000.0%	5040.0%	5170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2711	2678	2713	2681	2712	2678	2713	2705	2679	2682
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 382.29	$ 377.56	$ 382.59	$ 377.99	$ 382.42	$ 377.67	$ 382.5	$ 381.35	$ 377.75	$ 378.18
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.34	$ 1.36	$ 1.34	$ 1.36	$ 1.34	$ 1.36	$ 1.35	$ 1.34	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 383.65	$ 378.89	$ 383.95	$ 379.33	$ 383.78	$ 379.01	$ 383.86	$ 382.7	$ 379.09	$ 379.52
Annual savings in GHG from electricity savings [kg CO2e/year]	29.8	29.5	29.8	29.5	29.8	29.5	29.8	29.8	29.5	29.5
Annual savings in natural gas [m3/year]	51.2	51.2	51.2	51.2	52.4	52.4	53.19	51.2	53.19	51.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 474.38	$ 474.38	$ 474.38	$ 474.38	$ 485.53	$ 485.53	$ 492.78	$ 474.38	$ 492.78	$ 474.38
Annual savings in carbon tax for natural gas [$/year]	$ 118.4	$ 118.4	$ 118.4	$ 118.4	$ 121.19	$ 121.19	$ 123.	$ 118.4	$ 123.	$ 118.4
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 592.78	$ 592.78	$ 592.78	$ 592.78	$ 606.72	$ 606.72	$ 615.77	$ 592.78	$ 615.77	$ 592.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	2631.2	2631.2	2631.2	2631.2	2693	2693	2733.2	2631.2	2733.2	2631.2
Net Present Value [$]	$ 13,503.11	$ 13,547.87	$ 13,695.59	$ 13,764.72	$ 13,784.93	$ 13,829.33	$ 13,910.48	$ 13,942.07	$ 13,954.87	$ 13,955.19
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	10.61	14.09	14.09	10.61	14.09	14.09	10.61	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,563.	$ 2,959.	$ 1,947.	$ 1,947.	$ 2,563.	$ 1,947.	$ 2,563.	$ 2,563.	$ 2,959.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$.

SMALL Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60
Total increase in construction cost [$]	$ 4,353.48	$ 4,497.76	$ 4,639.48	$ 4,689.48	$ 4,703.48	$ 4,783.76	$ 4,798.46	$ 4,813.24	$ 4,833.76	$ 4,835.66
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 6,538.93	$ 6,755.64	$ 6,968.5	$ 7,043.6	$ 7,064.63	$ 7,185.21	$ 7,207.29	$ 7,229.49	$ 7,260.31	$ 7,263.16
Net Present Value [$]	$ 3,058.28	$ 3,061.07	$ 2,978.69	$ 2,628.05	$ 2,658.05	$ 2,980.75	$ 2,604.19	$ 2,712.71	$ 2,631.02	$ 2,558.26
Incremental dollars per GHG saving	$ 3.04	$ 3.07	$ 3.14	$ 3.31	$ 3.29	$ 3.17	$ 3.34	$ 3.3	$ 3.34	$ 3.39
Auxiliary Energy Required Heating [GJ/yr]	29.6	29.1	28.8	31.6	32.4	28.2	31.2	29.2	31	29.7
Annual Energy DHW [GJ/yr]	25.8	25.8	25.8	24.2	23	25.8	24.2	25.8	24.2	25.8
Annual Energy Space Heating [GJ/yr]	31.4	30.8	30.5	33.4	34.3	29.9	33.1	30.9	32.8	31.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	83.4	82.8	82.5	83.7	83.5	81.9	83.4	82.9	83.1	83.5
Design Heating Load [W]	9177	9044.3	9038.7	9549.6	9687.9	8906	9520.3	9301.8	9416.9	8906
Annual Energy Electricity [kWh/yr]	7421.1	7418	7416.7	7431.3	7435.7	7413.6	7429.5	7418.7	7428.1	7421.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 986.77	$ 986.33	$ 986.15	$ 988.21	$ 988.84	$ 985.71	$ 987.96	$ 986.43	$ 987.76	$ 986.83
Annual Energy Natural Gas [m3/yr]	1522.3	1505.7	1499	1530.4	1523.8	1482.5	1520.8	1509.4	1513.8	1524.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 656.67	$ 649.51	$ 646.62	$ 660.16	$ 657.31	$ 639.5	$ 656.02	$ 651.1	$ 653.	$ 657.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64297	65917	64567	54848	54579	66187	62678	59437	56468	66133
Upgrade Package List	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg1121102031	Pkg1121101031	Pkg2131102031	Pkg2111101031	Pkg1221101031	Pkg1131102031	Pkg2131102021
GHGI [kg/m2]	29.32	29.01	28.88	29.47	29.35	28.57	29.29	29.08	29.16	29.36
% ICC	1.9%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	80.6	79	78.3	85.8	88.1	76.7	84.9	79.3	84.2	80.8
Output: MEUI [kWh/(m2 * yr)]	157.1	155.3	154.7	158	157.4	152.9	157	155.7	156.3	157.3
Output: Better than ERS (%)	2030.0%	2090.0%	2120.0%	2010.0%	2020.0%	2180.0%	2030.0%	2080.0%	2060.0%	2020.0%
Output: Better than Envelope (%)	1910.0%	2050.0%	2130.0%	1370.0%	1150.0%	2300.0%	1480.0%	2020.0%	1530.0%	1890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	453	456	458	443	439	461	445	456	446	453
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 63.93	$ 64.37	$ 64.55	$ 62.49	$ 61.87	$ 64.99	$ 62.74	$ 64.27	$ 62.94	$ 63.87
Annual savings in carbon tax for electricity [$/year]	$ .23	$ .23	$ .23	$ .22	$ .22	$ .23	$ .22	$ .23	$ .22	$ .23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 64.16	$ 64.59	$ 64.78	$ 62.71	$ 62.09	$ 65.22	$ 62.97	$ 64.5	$ 63.17	$ 64.1
Annual savings in GHG from electricity savings [kg CO2e/year]	5	5	5	4.9	4.8	5.1	4.9	5	4.9	5
Annual savings in natural gas [m3/year]	27.78	28.4	28.64	27.47	27.72	29.26	27.83	28.26	28.09	27.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 257.35	$ 263.08	$ 265.39	$ 254.55	$ 256.83	$ 271.09	$ 257.87	$ 261.8	$ 260.28	$ 256.66
Annual savings in carbon tax for natural gas [$/year]	$ 64.23	$ 65.66	$ 66.24	$ 63.54	$ 64.1	$ 67.66	$ 64.36	$ 65.34	$ 64.97	$ 64.06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 321.58	$ 328.74	$ 331.63	$ 318.09	$ 320.94	$ 338.75	$ 322.23	$ 327.15	$ 325.25	$ 320.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	1427.4	1459.2	1472	1411.9	1424.5	1503.6	1430.3	1452.1	1443.7	1423.6
Net Present Value [$]	$ 3,058.28	$ 3,061.07	$ 2,978.69	$ 2,628.05	$ 2,658.05	$ 2,980.75	$ 2,604.19	$ 2,712.71	$ 2,631.02	$ 2,558.26
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	10.61	8.82	10.61	8.82	8.82	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 396.	$ 396.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$.	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 550.	$.

SMALL Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 8,103.48	$ 7,003.48	$ 8,247.76	$ 8,284.46	$ 8,389.48	$ 7,147.76	$ 8,441.38	$ 8,653.48	$ 8,533.76	$ 8,563.24
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,171.43	$ 10,519.23	$ 12,388.14	$ 12,443.26	$ 12,601.	$ 10,735.94	$ 12,678.95	$ 12,997.53	$ 12,817.71	$ 12,861.99
Net Present Value [$]	$ 4,538.65	$ 6,516.69	$ 4,470.95	$ 5,066.91	$ 4,595.69	$ 6,447.16	$ 4,666.94	$ 4,768.44	$ 4,526.16	$ 5,034.93
Incremental dollars per GHG saving	$ 2.33	$ 2.37	$ 2.37	$ 2.38	$ 2.41	$ 2.42	$ 2.43	$ 2.44	$ 2.45	$ 2.46
Auxiliary Energy Required Heating [GJ/yr]	32	32.4	31.4	32.8	31.1	31.8	32.8	32	30.5	31.5
Annual Energy DHW [GJ/yr]	15.8	25.8	15.8	15.8	15.8	25.8	15.8	14.3	15.8	15.8
Annual Energy Space Heating [GJ/yr]	16.3	17.1	16	16.7	16	16.8	16.6	16.3	15.7	16.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	60.7	71.9	60.5	61.2	60.4	71.7	60.5	59.3	60.1	60.8
Design Heating Load [W]	8932	9780.4	8799.3	9137.1	8793.8	9647.7	8793.8	8932	8661.1	9067.2
Annual Energy Electricity [kWh/yr]	12489.1	12805.6	12406.8	12624	12400.2	12722.6	12407.7	12491	12317.1	12503.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,703.89	$ 1,748.68	$ 1,692.25	$ 1,722.98	$ 1,691.31	$ 1,736.93	$ 1,692.37	$ 1,704.16	$ 1,679.55	$ 1,705.9
Annual Energy Natural Gas [m3/yr]	423.9	694.1	423.9	423.9	423.9	694.1	423.9	385.1	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 299.41	$ 182.86	$ 182.86	$ 182.86	$ 299.41	$ 182.86	$ 166.12	$ 182.86	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64309	54586	65929	62959	64579	56206	64525	64310	66199	59449
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2131101031	Pkg2111102031	Pkg2121102031	Pkg1131101031	Pkg2121102021	Pkg2121101031	Pkg2131102031	Pkg1221101031
GHGI [kg/m2]	9.29	14.38	9.28	9.3	9.28	14.37	9.28	8.56	9.27	9.29
% ICC	3.6%	3.1%	3.7%	3.7%	3.7%	3.2%	3.7%	3.8%	3.8%	3.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	87	88.1	85.3	89	84.6	86.5	89.1	87	83	85.6
Output: MEUI [kWh/(m2 * yr)]	94.3	124.6	93.5	95.6	93.4	123.8	93.9	90.4	92.6	94.4
Output: Better than ERS (%)	4030.0%	3310.0%	4050.0%	3980.0%	4060.0%	3320.0%	4050.0%	4170.0%	4090.0%	4020.0%
Output: Better than Envelope (%)	1260.0%	1150.0%	1420.0%	1040.0%	1500.0%	1310.0%	1040.0%	1260.0%	1670.0%	1390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4615	4931	4532	4750	4526	4848	4533	4616	4443	4629
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 650.66	$ 695.29	$ 639.05	$ 669.68	$ 638.12	$ 683.58	$ 639.18	$ 650.93	$ 626.41	$ 652.66
Annual savings in carbon tax for electricity [$/year]	$ 2.31	$ 2.47	$ 2.27	$ 2.37	$ 2.26	$ 2.42	$ 2.27	$ 2.31	$ 2.22	$ 2.31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 652.97	$ 697.75	$ 641.32	$ 672.05	$ 640.39	$ 686.01	$ 641.45	$ 653.23	$ 628.63	$ 654.98
Annual savings in GHG from electricity savings [kg CO2e/year]	50.8	54.2	49.9	52.2	49.8	53.3	49.9	50.8	48.9	50.9
Annual savings in natural gas [m3/year]	68.7	58.63	68.7	68.7	68.7	58.63	68.7	70.15	68.7	68.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 543.25	$ 636.52	$ 636.52	$ 636.52	$ 543.25	$ 636.52	$ 649.92	$ 636.52	$ 636.52
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 135.59	$ 158.87	$ 158.87	$ 158.87	$ 135.59	$ 158.87	$ 162.22	$ 158.87	$ 158.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 678.84	$ 795.39	$ 795.39	$ 795.39	$ 678.84	$ 795.39	$ 812.13	$ 795.39	$ 795.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3013.2	3530.5	3530.5	3530.5	3013.2	3530.5	3604.8	3530.5	3530.5
Net Present Value [$]	$ 4,538.65	$ 6,516.69	$ 4,470.95	$ 5,066.91	$ 4,595.69	$ 6,447.16	$ 4,666.94	$ 4,768.44	$ 4,526.16	$ 5,034.93
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	10.61	8.82	10.61	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 105.02	$ 249.3	$.	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

SMALL Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,097.76	$ 4,953.48	$ 5,383.76	$ 5,239.48	$ 6,057.52	$ 5,913.24	$ 6,343.52	$ 6,199.24	$ 5,647.76	$ 5,503.48
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 7,656.84	$ 7,440.13	$ 8,086.41	$ 7,869.7	$ 9,098.4	$ 8,881.69	$ 9,527.97	$ 9,311.26	$ 8,482.94	$ 8,266.23
Net Present Value [$]	$ 4,148.21	$ 4,140.86	$ 4,074.98	$ 4,067.7	$ 4,009.04	$ 4,002.67	$ 3,933.03	$ 3,927.63	$ 3,919.53	$ 3,911.46
Incremental dollars per GHG saving	$ 2.75	$ 2.72	$ 2.83	$ 2.8	$ 2.98	$ 2.95	$ 3.05	$ 3.03	$ 2.93	$ 2.9
Auxiliary Energy Required Heating [GJ/yr]	31.4	32	30.5	31.1	28.1	28.7	27.2	27.8	31.4	32
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	14.3	14.3
Annual Energy Space Heating [GJ/yr]	33.2	33.9	32.3	33	29.7	30.4	28.8	29.5	33.3	33.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	75.2	75.8	74.3	74.9	71.7	72.3	70.8	71.4	73.8	74.4
Design Heating Load [W]	8716.7	8849.4	8578.5	8711.2	8330.6	8463.3	8192.4	8325.1	8716.7	8849.4
Annual Energy Electricity [kWh/yr]	7430.3	7433.5	7425.7	7429	7412.8	7416	7408.3	7411.5	7430.4	7433.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 988.07	$ 988.53	$ 987.42	$ 987.89	$ 985.6	$ 986.05	$ 984.96	$ 985.41	$ 988.09	$ 988.54
Annual Energy Natural Gas [m3/yr]	1300.5	1317.6	1276.5	1293.6	1207.9	1224.9	1184.2	1201.1	1262.1	1279.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 560.99	$ 568.37	$ 550.64	$ 558.01	$ 521.05	$ 528.38	$ 510.82	$ 518.11	$ 544.43	$ 551.85
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	65920	64300	66190	64570	73804	70672	74074	70942	65921	64301
Upgrade Package List	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2231101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2131101031	Pkg2121101031
GHGI [kg/m2]	25.16	25.49	24.71	25.04	23.43	23.75	22.98	23.3	24.45	24.77
% ICC	2.3%	2.2%	2.4%	2.3%	2.7%	2.6%	2.8%	2.7%	2.5%	2.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	85.3	87	83	84.6	76.3	77.9	74	75.6	85.3	87
Output: MEUI [kWh/(m2 * yr)]	134.7	136.5	132.2	134	125.2	126.9	122.7	124.4	130.8	132.6
Output: Better than ERS (%)	2460.0%	2400.0%	2550.0%	2490.0%	2810.0%	2750.0%	2900.0%	2840.0%	2600.0%	2540.0%
Output: Better than Envelope (%)	1420.0%	1260.0%	1670.0%	1500.0%	2320.0%	2160.0%	2570.0%	2400.0%	1420.0%	1260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	444	441	449	446	462	458	466	463	444	441
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 62.63	$ 62.18	$ 63.28	$ 62.82	$ 65.1	$ 64.65	$ 65.73	$ 65.28	$ 62.62	$ 62.17
Annual savings in carbon tax for electricity [$/year]	$ .22	$ .22	$ .22	$ .22	$ .23	$ .23	$ .23	$ .23	$ .22	$ .22
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 62.85	$ 62.4	$ 63.51	$ 63.04	$ 65.33	$ 64.88	$ 65.97	$ 65.51	$ 62.84	$ 62.39
Annual savings in GHG from electricity savings [kg CO2e/year]	4.9	4.9	4.9	4.9	5.1	5	5.1	5.1	4.9	4.8
Annual savings in natural gas [m3/year]	36.04	35.4	36.93	36.3	39.49	38.86	40.37	39.74	37.47	36.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 333.92	$ 328.01	$ 342.2	$ 336.3	$ 365.88	$ 360.01	$ 374.06	$ 368.23	$ 347.17	$ 341.23
Annual savings in carbon tax for natural gas [$/year]	$ 83.34	$ 81.87	$ 85.41	$ 83.94	$ 91.32	$ 89.86	$ 93.36	$ 91.91	$ 86.65	$ 85.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 417.26	$ 409.88	$ 427.61	$ 420.24	$ 457.2	$ 449.87	$ 467.43	$ 460.14	$ 433.82	$ 426.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	1852.1	1819.3	1898	1865.3	2029.4	1996.8	2074.8	2042.4	1925.6	1892.7
Net Present Value [$]	$ 4,148.21	$ 4,140.86	$ 4,074.98	$ 4,067.7	$ 4,009.04	$ 4,002.67	$ 3,933.03	$ 3,927.63	$ 3,919.53	$ 3,911.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	10.61	8.82	8.82	10.61	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	5.28	5.28	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 2,066.15	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 2,066.15	$ 2,066.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

SMALL Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,063.24	$ 9,207.52	$ 9,349.24	$ 9,493.52	$ 9,545.42	$ 9,613.24	$ 9,743.52	$ 9,757.52	$ 9,795.42	$ 9,899.24
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,612.99	$ 13,829.7	$ 14,042.56	$ 14,259.27	$ 14,337.22	$ 14,439.09	$ 14,634.77	$ 14,655.8	$ 14,712.72	$ 14,868.66
Net Present Value [$]	$ 4,481.41	$ 4,411.89	$ 4,529.87	$ 4,460.16	$ 4,454.	$ 4,711.2	$ 6,121.7	$ 4,641.49	$ 6,066.06	$ 4,759.84
Incremental dollars per GHG saving	$ 2.6	$ 2.64	$ 2.68	$ 2.72	$ 2.74	$ 2.7	$ 3.13	$ 2.74	$ 3.15	$ 2.78
Auxiliary Energy Required Heating [GJ/yr]	28.7	28.1	27.8	27.2	28.8	28.7	25.1	28.1	26.5	27.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	14.3	23	14.3	23	14.3
Annual Energy Space Heating [GJ/yr]	14.7	14.4	14.4	14.1	14.7	14.7	13.4	14.5	14	14.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	59.3	59	59	58.7	58.6	57.9	65.6	57.6	65.5	57.6
Design Heating Load [W]	8545.9	8413.2	8407.7	8275	8275	8545.9	8608.2	8413.2	8608.2	8407.7
Annual Energy Electricity [kWh/yr]	12094.1	12011	12001.8	11918.7	11896.1	12096	11833.8	12012.9	11792	12003.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,648.	$ 1,636.24	$ 1,634.94	$ 1,623.18	$ 1,619.98	$ 1,648.27	$ 1,611.17	$ 1,636.51	$ 1,605.25	$ 1,635.22
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	385.1	618.5	385.1	618.5	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 266.8	$ 166.12	$ 266.8	$ 166.12
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70681	73813	70951	74083	74029	70682	74082	73814	74028	70952
Upgrade Package List	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2231102021	Pkg2221101031	Pkg2231102031	Pkg2231101031	Pkg2231102021	Pkg2221102031
GHGI [kg/m2]	9.24	9.23	9.23	9.22	9.22	8.52	12.86	8.51	12.86	8.51
% ICC	4.0%	4.1%	4.1%	4.2%	4.2%	4.3%	4.3%	4.3%	4.3%	4.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.9	76.3	75.6	74	78.2	78	68.1	76.3	72	75.7
Output: MEUI [kWh/(m2 * yr)]	90.4	89.6	89.5	88.7	88.9	86.5	107.3	85.7	107.4	85.6
Output: Better than ERS (%)	4170.0%	4200.0%	4200.0%	4230.0%	4240.0%	4310.0%	3890.0%	4340.0%	3900.0%	4340.0%
Output: Better than Envelope (%)	2160.0%	2320.0%	2400.0%	2570.0%	2130.0%	2160.0%	3140.0%	2320.0%	2760.0%	2400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4220	4136	4127	4044	4022	4222	3959	4138	3918	4129
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 594.96	$ 583.25	$ 581.95	$ 570.23	$ 567.05	$ 595.23	$ 558.26	$ 583.51	$ 552.37	$ 582.23
Annual savings in carbon tax for electricity [$/year]	$ 2.11	$ 2.07	$ 2.06	$ 2.02	$ 2.01	$ 2.11	$ 1.98	$ 2.07	$ 1.96	$ 2.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 597.07	$ 585.31	$ 584.01	$ 572.25	$ 569.06	$ 597.34	$ 560.24	$ 585.58	$ 554.33	$ 584.3
Annual savings in GHG from electricity savings [kg CO2e/year]	46.4	45.5	45.4	44.5	44.2	46.4	43.6	45.5	43.1	45.4
Annual savings in natural gas [m3/year]	68.7	68.7	68.7	68.7	68.7	70.15	61.45	70.15	61.45	70.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 636.52	$ 636.52	$ 636.52	$ 636.52	$ 649.92	$ 569.34	$ 649.92	$ 569.34	$ 649.92
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 158.87	$ 158.87	$ 158.87	$ 158.87	$ 162.22	$ 142.11	$ 162.22	$ 142.11	$ 162.22
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 795.39	$ 795.39	$ 795.39	$ 795.39	$ 812.13	$ 711.45	$ 812.13	$ 711.45	$ 812.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3530.5	3530.5	3530.5	3530.5	3604.8	3157.9	3604.8	3157.9	3604.8
Net Present Value [$]	$ 4,481.41	$ 4,411.89	$ 4,529.87	$ 4,460.16	$ 4,454.	$ 4,711.2	$ 6,121.7	$ 4,641.49	$ 6,066.06	$ 4,759.84
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	10.61	10.61	8.82	10.61	8.82	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.

SMALL Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,063.24	$ 9,207.52	$ 9,349.24	$ 9,613.24	$ 9,493.52	$ 9,545.42	$ 9,757.52	$ 9,913.24	$ 9,899.24	$ 10,057.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,612.99	$ 13,829.7	$ 14,042.56	$ 14,439.09	$ 14,259.27	$ 14,337.22	$ 14,655.8	$ 14,889.69	$ 14,868.66	$ 15,106.4
Net Present Value [$]	$ 4,481.41	$ 4,411.89	$ 4,529.87	$ 4,711.2	$ 4,460.16	$ 4,454.	$ 4,641.49	$ 4,799.26	$ 4,759.84	$ 4,729.73
Incremental dollars per GHG saving	$ 2.6	$ 2.64	$ 2.68	$ 2.7	$ 2.72	$ 2.74	$ 2.74	$ 2.75	$ 2.78	$ 2.79
Auxiliary Energy Required Heating [GJ/yr]	28.7	28.1	27.8	28.7	27.2	28.8	28.1	28.7	27.8	28.1
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	15.8	15.8	14.3	13.4	14.3	13.4
Annual Energy Space Heating [GJ/yr]	14.7	14.4	14.4	14.7	14.1	14.7	14.5	14.7	14.4	14.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	59.3	59	59	57.9	58.7	58.6	57.6	56.9	57.6	56.6
Design Heating Load [W]	8545.9	8413.2	8407.7	8545.9	8275	8275	8413.2	8545.9	8407.7	8413.2
Annual Energy Electricity [kWh/yr]	12094.1	12011	12001.8	12096	11918.7	11896.1	12012.9	12097.3	12003.8	12014.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,648.	$ 1,636.24	$ 1,634.94	$ 1,648.27	$ 1,623.18	$ 1,619.98	$ 1,636.51	$ 1,648.45	$ 1,635.22	$ 1,636.69
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	385.1	423.9	423.9	385.1	359.4	385.1	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 182.86	$ 166.12	$ 155.03	$ 166.12	$ 155.03
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70681	73813	70951	70682	74083	74029	73814	70683	70952	73815
Upgrade Package List	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2231102021	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2231101031
GHGI [kg/m2]	9.24	9.23	9.23	8.52	9.22	9.22	8.51	8.04	8.51	8.03
% ICC	4.0%	4.1%	4.1%	4.3%	4.2%	4.2%	4.3%	4.4%	4.4%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.9	76.3	75.6	78	74	78.2	76.3	78	75.7	76.4
Output: MEUI [kWh/(m2 * yr)]	90.4	89.6	89.5	86.5	88.7	88.9	85.7	83.9	85.6	83.1
Output: Better than ERS (%)	4170.0%	4200.0%	4200.0%	4310.0%	4230.0%	4240.0%	4340.0%	4410.0%	4340.0%	4430.0%
Output: Better than Envelope (%)	2160.0%	2320.0%	2400.0%	2160.0%	2570.0%	2130.0%	2320.0%	2160.0%	2400.0%	2320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4220	4136	4127	4222	4044	4022	4138	4223	4129	4140
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 594.96	$ 583.25	$ 581.95	$ 595.23	$ 570.23	$ 567.05	$ 583.51	$ 595.41	$ 582.23	$ 583.7
Annual savings in carbon tax for electricity [$/year]	$ 2.11	$ 2.07	$ 2.06	$ 2.11	$ 2.02	$ 2.01	$ 2.07	$ 2.11	$ 2.06	$ 2.07
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 597.07	$ 585.31	$ 584.01	$ 597.34	$ 572.25	$ 569.06	$ 585.58	$ 597.53	$ 584.3	$ 585.77
Annual savings in GHG from electricity savings [kg CO2e/year]	46.4	45.5	45.4	46.4	44.5	44.2	45.5	46.5	45.4	45.5
Annual savings in natural gas [m3/year]	68.7	68.7	68.7	70.15	68.7	68.7	70.15	71.1	70.15	71.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 636.52	$ 636.52	$ 649.92	$ 636.52	$ 636.52	$ 649.92	$ 658.79	$ 649.92	$ 658.79
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 158.87	$ 158.87	$ 162.22	$ 158.87	$ 158.87	$ 162.22	$ 164.43	$ 162.22	$ 164.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 795.39	$ 795.39	$ 812.13	$ 795.39	$ 795.39	$ 812.13	$ 823.22	$ 812.13	$ 823.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3530.5	3530.5	3604.8	3530.5	3530.5	3604.8	3654	3604.8	3654
Net Present Value [$]	$ 4,481.41	$ 4,411.89	$ 4,529.87	$ 4,711.2	$ 4,460.16	$ 4,454.	$ 4,641.49	$ 4,799.26	$ 4,759.84	$ 4,729.73
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	8.82	10.61	10.61	8.82	8.82	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 396.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.

SMALL Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,073.83	$ 16,260.83	$ 16,349.71	$ 16,524.71	$ 16,689.83	$ 16,585.83	$ 16,601.43	$ 16,745.71	$ 16,864.83	$ 16,760.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,142.89	$ 24,423.77	$ 24,557.26	$ 24,820.11	$ 25,068.12	$ 24,911.92	$ 24,935.35	$ 25,152.06	$ 25,330.97	$ 25,174.77
Net Present Value [$]	$ 3,651.16	$ 3,875.36	$ 3,918.98	$ 4,089.42	$ 4,166.87	$ 4,172.93	$ 4,209.34	$ 4,211.29	$ 4,336.41	$ 4,343.2
Incremental dollars per GHG saving	$ 5.97	$ 6.06	$ 6.07	$ 6.13	$ 6.15	$ 6.17	$ 6.18	$ 6.17	$ 6.21	$ 6.23
Auxiliary Energy Required Heating [GJ/yr]	18	18.2	18	18	17.6	18.1	18.2	17.6	17.6	18.1
Annual Energy DHW [GJ/yr]	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
Annual Energy Space Heating [GJ/yr]	19.1	19.3	19.1	19.1	18.7	19.1	19.2	18.6	18.7	19.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	59.6	59.7	59.5	59.5	59.1	59.6	59.7	59.1	59.1	59.6
Design Heating Load [W]	5693.7	5605.5	5751.5	5645.2	5607.5	5569.4	5889.3	5671.2	5501.2	5463.2
Annual Energy Electricity [kWh/yr]	7619.1	7619.9	7618.9	7618.8	7616.9	7619.3	7619.7	7616.7	7616.8	7619.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,014.79	$ 1,014.9	$ 1,014.76	$ 1,014.75	$ 1,014.48	$ 1,014.82	$ 1,014.87	$ 1,014.45	$ 1,014.46	$ 1,014.8
Annual Energy Natural Gas [m3/yr]	863.2	867.4	862.3	861.8	851.9	864.3	866.7	850.6	851.3	863.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 372.35	$ 374.17	$ 371.97	$ 371.75	$ 367.48	$ 372.83	$ 373.86	$ 366.92	$ 367.22	$ 372.61
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	100734	101814	99438	104496	101382	102012	98142	100086	105072	105342
Upgrade Package List	Pkg3341203054	Pkg3341402054	Pkg3331303054	Pkg4331302054	Pkg3341303054	Pkg3341403053	Pkg3321403054	Pkg3331403054	Pkg4341302054	Pkg4341402053
GHGI [kg/m2]	16.99	17.07	16.98	16.97	16.78	17.01	17.06	16.76	16.77	17
% ICC	7.1%	7.2%	7.3%	7.3%	7.4%	7.4%	7.4%	7.4%	7.5%	7.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target MEUI cooling [kWh/(m2 * yr)]	108	108	108	108	108	108	108	108	108	108
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	49	49.4	48.9	48.9	47.9	49.1	49.4	47.8	47.9	49.1
Output: MEUI [kWh/(m2 * yr)]	92.3	92.7	92.2	92.1	91.1	92.4	92.6	91	91.1	92.3
Output: Better than ERS (%)	4020.0%	4010.0%	4030.0%	4030.0%	4070.0%	4020.0%	4010.0%	4070.0%	4070.0%	4020.0%
Output: Better than Envelope (%)	5080.0%	5030.0%	5080.0%	5080.0%	5190.0%	5050.0%	5030.0%	5190.0%	5190.0%	5050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	255	255	256	256	258	255	255	258	258	255
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 36.01	$ 35.9	$ 36.04	$ 36.05	$ 36.32	$ 35.98	$ 35.93	$ 36.35	$ 36.34	$ 36.
Annual savings in carbon tax for electricity [$/year]	$ .13	$ .13	$ .13	$ .13	$ .13	$ .13	$ .13	$ .13	$ .13	$ .13
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 36.14	$ 36.03	$ 36.17	$ 36.18	$ 36.45	$ 36.11	$ 36.05	$ 36.48	$ 36.46	$ 36.12
Annual savings in GHG from electricity savings [kg CO2e/year]	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Annual savings in natural gas [m3/year]	52.33	52.18	52.37	52.39	52.75	52.29	52.2	52.8	52.78	52.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 484.87	$ 483.42	$ 485.18	$ 485.36	$ 488.77	$ 484.49	$ 483.67	$ 489.22	$ 488.98	$ 484.67
Annual savings in carbon tax for natural gas [$/year]	$ 121.02	$ 120.66	$ 121.1	$ 121.14	$ 122.	$ 120.93	$ 120.72	$ 122.11	$ 122.05	$ 120.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 605.9	$ 604.08	$ 606.28	$ 606.5	$ 610.77	$ 605.42	$ 604.39	$ 611.33	$ 611.03	$ 605.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	2689.4	2681.3	2691.1	2692.1	2711	2687.3	2682.7	2713.5	2712.2	2688.2
Net Present Value [$]	$ 3,651.16	$ 3,875.36	$ 3,918.98	$ 4,089.42	$ 4,166.87	$ 4,172.93	$ 4,209.34	$ 4,211.29	$ 4,336.41	$ 4,343.2
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	14.09	10.61	14.09	14.09	14.09	14.09	10.61	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 1,507.	$ 1,507.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 589.42	$ 105.02	$ 249.3	$ 589.42	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,959.	$ 2,959.	$ 2,563.	$ 2,959.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,373.83	$ 18,560.83	$ 18,649.71	$ 18,824.71	$ 18,885.83	$ 18,901.43	$ 18,923.83	$ 18,989.83	$ 19,045.71	$ 19,060.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,597.49	$ 27,878.37	$ 28,011.86	$ 28,274.71	$ 28,366.52	$ 28,389.95	$ 28,423.59	$ 28,522.72	$ 28,606.66	$ 28,629.37
Net Present Value [$]	$ 11,403.97	$ 11,582.94	$ 11,762.02	$ 11,821.44	$ 11,890.05	$ 12,025.79	$ 11,633.21	$ 11,963.92	$ 11,945.31	$ 11,944.72
Incremental dollars per GHG saving	$ 5.26	$ 5.31	$ 5.34	$ 5.39	$ 5.41	$ 5.41	$ 5.3	$ 5.43	$ 5.45	$ 5.45
Auxiliary Energy Required Heating [GJ/yr]	18	18.2	18	18	18.1	18.1	18	17.6	17.6	18
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	14.3	15.8	15.8	15.8
Annual Energy Space Heating [GJ/yr]	9.8	9.8	9.8	9.6	9.8	9.9	9.8	9.6	9.6	9.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	56	56	56.1	55.9	56	56.1	54.5	55.9	55.8	55.8
Design Heating Load [W]	5767.2	5679.1	5825	5703	5643	5962.8	5767.2	5681	5744.8	5520.9
Annual Energy Electricity [kWh/yr]	11166.5	11163.4	11198.4	11153.5	11156.4	11203.1	11168.2	11144.7	11115.8	11109.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,516.74	$ 1,516.31	$ 1,521.26	$ 1,514.91	$ 1,515.32	$ 1,521.92	$ 1,516.99	$ 1,513.66	$ 1,509.57	$ 1,508.71
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	385.1	423.9	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 182.86	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	100741	101821	99445	104503	102019	98149	100742	101389	100093	105349
Upgrade Package List	Pkg3341203054	Pkg3341402054	Pkg3331303054	Pkg4331302054	Pkg3341403053	Pkg3321403054	Pkg3341203054	Pkg3341303054	Pkg3331403054	Pkg4341402053
GHGI [kg/m2]	9.14	9.14	9.15	9.14	9.14	9.15	8.42	9.14	9.14	9.14
% ICC	8.1%	8.2%	8.3%	8.3%	8.4%	8.4%	8.4%	8.4%	8.4%	8.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	49	49.4	48.9	48.8	49.1	49.3	49	47.9	47.7	49
Output: MEUI [kWh/(m2 * yr)]	80.9	80.9	81.2	80.7	80.9	81.3	77	80.7	80.5	80.4
Output: Better than ERS (%)	4490.0%	4490.0%	4480.0%	4500.0%	4490.0%	4480.0%	4640.0%	4500.0%	4510.0%	4510.0%
Output: Better than Envelope (%)	5080.0%	5030.0%	5080.0%	5080.0%	5050.0%	5050.0%	5080.0%	5190.0%	5190.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3292	3289	3324	3279	3282	3329	3294	3270	3241	3235
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 464.17	$ 463.73	$ 468.67	$ 462.34	$ 462.75	$ 469.33	$ 464.41	$ 461.1	$ 457.02	$ 456.16
Annual savings in carbon tax for electricity [$/year]	$ 1.65	$ 1.64	$ 1.66	$ 1.64	$ 1.64	$ 1.66	$ 1.65	$ 1.64	$ 1.62	$ 1.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 465.82	$ 465.38	$ 470.33	$ 463.98	$ 464.39	$ 471.	$ 466.06	$ 462.73	$ 458.64	$ 457.78
Annual savings in GHG from electricity savings [kg CO2e/year]	36.2	36.2	36.6	36.1	36.1	36.6	36.2	36	35.7	35.6
Annual savings in natural gas [m3/year]	68.7	68.7	68.7	68.7	68.7	68.7	70.15	68.7	68.7	68.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 636.52	$ 636.52	$ 636.52	$ 636.52	$ 636.52	$ 649.92	$ 636.52	$ 636.52	$ 636.52
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 158.87	$ 158.87	$ 158.87	$ 158.87	$ 158.87	$ 162.22	$ 158.87	$ 158.87	$ 158.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 795.39	$ 795.39	$ 795.39	$ 795.39	$ 795.39	$ 812.13	$ 795.39	$ 795.39	$ 795.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3530.5	3530.5	3530.5	3530.5	3530.5	3604.8	3530.5	3530.5	3530.5
Net Present Value [$]	$ 11,403.97	$ 11,582.94	$ 11,762.02	$ 11,821.44	$ 11,890.05	$ 12,025.79	$ 11,633.21	$ 11,963.92	$ 11,945.31	$ 11,944.72
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	14.09	10.61	14.09	14.09	14.09	14.09	14.09	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 1,507.	$ 1,507.	$ 1,507.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 589.42	$ 105.02	$ 589.42	$ 589.42	$ 249.3	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,959.	$ 2,959.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

SMALL Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Coolings=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,373.83	$ 18,923.83	$ 18,560.83	$ 19,223.83	$ 18,649.71	$ 19,110.83	$ 19,410.83	$ 19,199.71	$ 18,824.71	$ 19,499.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,597.49	$ 28,423.59	$ 27,878.37	$ 28,874.19	$ 28,011.86	$ 28,704.47	$ 29,155.07	$ 28,837.96	$ 28,274.71	$ 29,288.56
Net Present Value [$]	$ 11,403.97	$ 11,633.21	$ 11,582.94	$ 11,721.09	$ 11,762.02	$ 11,812.18	$ 11,899.87	$ 11,991.25	$ 11,821.44	$ 12,079.13
Incremental dollars per GHG saving	$ 5.26	$ 5.3	$ 5.31	$ 5.31	$ 5.34	$ 5.36	$ 5.37	$ 5.38	$ 5.39	$ 5.39
Auxiliary Energy Required Heating [GJ/yr]	18	18	18.2	18	18	18.2	18.2	18	18	18
Annual Energy DHW [GJ/yr]	15.8	14.3	15.8	13.4	15.8	14.3	13.4	14.3	15.8	13.4
Annual Energy Space Heating [GJ/yr]	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6	9.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	56	54.5	56	53.6	56.1	54.5	53.6	54.7	55.9	53.7
Design Heating Load [W]	5767.2	5767.2	5679.1	5767.2	5825	5679.1	5679.1	5825	5703	5825
Annual Energy Electricity [kWh/yr]	11166.5	11168.2	11163.4	11169.4	11198.4	11165.1	11166.2	11200.1	11153.5	11201.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,516.74	$ 1,516.99	$ 1,516.31	$ 1,517.16	$ 1,521.26	$ 1,516.55	$ 1,516.7	$ 1,521.5	$ 1,514.91	$ 1,521.67
Annual Energy Natural Gas [m3/yr]	423.9	385.1	423.9	359.4	423.9	385.1	359.4	385.1	423.9	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 166.12	$ 182.86	$ 155.03	$ 182.86	$ 166.12	$ 155.03	$ 166.12	$ 182.86	$ 155.03
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	100741	100742	101821	100743	99445	101822	101823	99446	104503	99447
Upgrade Package List	Pkg3341203054	Pkg3341203054	Pkg3341402054	Pkg3341203054	Pkg3331303054	Pkg3341402054	Pkg3341402054	Pkg3331303054	Pkg4331302054	Pkg3331303054
GHGI [kg/m2]	9.14	8.42	9.14	7.94	9.15	8.42	7.94	8.42	9.14	7.94
% ICC	8.1%	8.4%	8.2%	8.5%	8.3%	8.5%	8.6%	8.5%	8.3%	8.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	49	49	49.4	49	48.9	49.4	49.4	48.9	48.8	48.9
Output: MEUI [kWh/(m2 * yr)]	80.9	77	80.9	74.4	81.2	77	74.4	77.3	80.7	74.7
Output: Better than ERS (%)	4490.0%	4640.0%	4490.0%	4730.0%	4480.0%	4640.0%	4730.0%	4620.0%	4500.0%	4720.0%
Output: Better than Envelope (%)	5080.0%	5080.0%	5030.0%	5080.0%	5080.0%	5030.0%	5030.0%	5080.0%	5080.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3292	3294	3289	3295	3324	3291	3292	3326	3279	3327
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 464.17	$ 464.41	$ 463.73	$ 464.58	$ 468.67	$ 463.97	$ 464.13	$ 468.91	$ 462.34	$ 469.08
Annual savings in carbon tax for electricity [$/year]	$ 1.65	$ 1.65	$ 1.64	$ 1.65	$ 1.66	$ 1.65	$ 1.65	$ 1.66	$ 1.64	$ 1.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 465.82	$ 466.06	$ 465.38	$ 466.23	$ 470.33	$ 465.62	$ 465.78	$ 470.57	$ 463.98	$ 470.74
Annual savings in GHG from electricity savings [kg CO2e/year]	36.2	36.2	36.2	36.2	36.6	36.2	36.2	36.6	36.1	36.6
Annual savings in natural gas [m3/year]	68.7	70.15	68.7	71.1	68.7	70.15	71.1	70.15	68.7	71.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 649.92	$ 636.52	$ 658.79	$ 636.52	$ 649.92	$ 658.79	$ 649.92	$ 636.52	$ 658.79
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 162.22	$ 158.87	$ 164.43	$ 158.87	$ 162.22	$ 164.43	$ 162.22	$ 158.87	$ 164.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 812.13	$ 795.39	$ 823.22	$ 795.39	$ 812.13	$ 823.22	$ 812.13	$ 795.39	$ 823.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3604.8	3530.5	3654	3530.5	3604.8	3654	3604.8	3530.5	3654
Net Present Value [$]	$ 11,403.97	$ 11,633.21	$ 11,582.94	$ 11,721.09	$ 11,762.02	$ 11,812.18	$ 11,899.87	$ 11,991.25	$ 11,821.44	$ 12,079.13
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.61	14.09	14.09	10.61	10.61	14.09	10.61	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 682.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 589.42	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 1,947.	$ 2,959.	$ 1,947.	$ 2,563.	$ 2,959.	$ 2,959.	$ 2,563.	$ 2,563.	$ 2,563.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.

SMALL Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,373.83	$ 18,560.83	$ 18,923.83	$ 19,223.83	$ 18,649.71	$ 19,110.83	$ 18,824.71	$ 18,885.83	$ 19,410.83	$ 19,060.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,597.49	$ 27,878.37	$ 28,423.59	$ 28,874.19	$ 28,011.86	$ 28,704.47	$ 28,274.71	$ 28,366.52	$ 29,155.07	$ 28,629.37
Net Present Value [$]	$ 11,582.97	$ 11,582.94	$ 11,633.21	$ 11,762.09	$ 11,762.02	$ 11,812.18	$ 11,821.44	$ 11,890.05	$ 11,899.87	$ 11,944.72
Incremental dollars per GHG saving	$ 5.26	$ 5.31	$ 5.3	$ 5.31	$ 5.34	$ 5.36	$ 5.39	$ 5.41	$ 5.37	$ 5.45
Auxiliary Energy Required Heating [GJ/yr]	18	18.2	18	18	18	18.2	18	18.1	18.2	18
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	13.4	15.8	14.3	15.8	15.8	13.4	15.8
Annual Energy Space Heating [GJ/yr]	9.8	9.8	9.8	9.8	9.8	9.8	9.6	9.8	9.8	9.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	56	56	54.5	53.6	56.1	54.5	55.9	56	53.6	55.8
Design Heating Load [W]	5767.2	5679.1	5767.2	5767.2	5825	5679.1	5703	5643	5679.1	5520.9
Annual Energy Electricity [kWh/yr]	11166.5	11163.4	11168.2	11169.4	11198.4	11165.1	11153.5	11156.4	11166.2	11109.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,516.74	$ 1,516.31	$ 1,516.99	$ 1,517.16	$ 1,521.26	$ 1,516.55	$ 1,514.91	$ 1,515.32	$ 1,516.7	$ 1,508.71
Annual Energy Natural Gas [m3/yr]	423.9	423.9	385.1	359.4	423.9	385.1	423.9	423.9	359.4	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 166.12	$ 155.03	$ 182.86	$ 166.12	$ 182.86	$ 182.86	$ 155.03	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	100741	101821	100742	100743	99445	101822	104503	102019	101823	105349
Upgrade Package List	Pkg3341203054	Pkg3341402054	Pkg3341203054	Pkg3341203054	Pkg3331303054	Pkg3341402054	Pkg4331302054	Pkg3341403053	Pkg3341402054	Pkg4341402053
GHGI [kg/m2]	9.14	9.14	8.42	7.94	9.15	8.42	9.14	9.14	7.94	9.14
% ICC	8.1%	8.2%	8.4%	8.5%	8.3%	8.5%	8.3%	8.4%	8.6%	8.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	88	88	88	88	88	88	88	88	88	88
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	49	49.4	49	49	48.9	49.4	48.8	49.1	49.4	49
Output: MEUI [kWh/(m2 * yr)]	80.9	80.9	77	74.4	81.2	77	80.7	80.9	74.4	80.4
Output: Better than ERS (%)	4490.0%	4490.0%	4640.0%	4730.0%	4480.0%	4640.0%	4500.0%	4490.0%	4730.0%	4510.0%
Output: Better than Envelope (%)	5080.0%	5030.0%	5080.0%	5080.0%	5080.0%	5030.0%	5080.0%	5050.0%	5030.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3292	3289	3294	3295	3324	3291	3279	3282	3292	3235
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 464.17	$ 463.73	$ 464.41	$ 464.58	$ 468.67	$ 463.97	$ 462.34	$ 462.75	$ 464.13	$ 456.16
Annual savings in carbon tax for electricity [$/year]	$ 1.65	$ 1.64	$ 1.65	$ 1.65	$ 1.66	$ 1.65	$ 1.64	$ 1.64	$ 1.65	$ 1.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 465.82	$ 465.38	$ 466.06	$ 466.23	$ 470.33	$ 465.62	$ 463.98	$ 464.39	$ 465.78	$ 457.78
Annual savings in GHG from electricity savings [kg CO2e/year]	36.2	36.2	36.2	36.2	36.6	36.2	36.1	36.1	36.2	35.6
Annual savings in natural gas [m3/year]	68.7	68.7	70.15	71.1	68.7	70.15	68.7	68.7	71.1	68.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.52	$ 636.52	$ 649.92	$ 658.79	$ 636.52	$ 649.92	$ 636.52	$ 636.52	$ 658.79	$ 636.52
Annual savings in carbon tax for natural gas [$/year]	$ 158.87	$ 158.87	$ 162.22	$ 164.43	$ 158.87	$ 162.22	$ 158.87	$ 158.87	$ 164.43	$ 158.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 795.39	$ 795.39	$ 812.13	$ 823.22	$ 795.39	$ 812.13	$ 795.39	$ 795.39	$ 823.22	$ 795.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	3530.5	3530.5	3604.8	3654	3530.5	3604.8	3530.5	3530.5	3654	3530.5
Net Present Value [$]	$ 11,403.97	$ 11,582.94	$ 11,633.21	$ 11,721.09	$ 11,762.02	$ 11,812.18	$ 11,821.44	$ 11,890.05	$ 11,899.87	$ 11,944.72
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.61	14.09	14.09	14.09	10.61	10.61	14.09	10.61	10.61
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 682.	$ 1,507.	$ 1,507.	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 589.42	$ 589.42	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 589.42
Foundation Slab Below Grade Code	BC EffR10	BC EffR20	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,959.	$ 1,947.	$ 1,947.	$ 2,563.	$ 2,959.	$ 2,563.	$ 2,959.	$ 2,959.	$ 2,959.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$.	$ 850.	$.

SMALL Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,313.24	$ 5,365.14	$ 5,457.52	$ 5,494.22	$ 5,509.42	$ 5,599.24	$ 5,651.14	$ 5,743.52	$ 5,795.42	$ 5,863.24
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 7,980.49	$ 8,058.44	$ 8,197.2	$ 8,252.32	$ 8,275.15	$ 8,410.06	$ 8,488.01	$ 8,626.77	$ 8,704.72	$ 8,806.59
Net Present Value [$]	$ 4,340.83	$ 3,940.31	$ 4,372.75	$ 3,949.87	$ 3,974.29	$ 4,307.47	$ 3,910.71	$ 4,338.42	$ 3,944.5	$ 4,188.77
Incremental dollars per GHG saving	$ 2.78	$ 2.92	$ 2.8	$ 2.94	$ 2.93	$ 2.84	$ 2.98	$ 2.86	$ 3.	$ 2.92
Auxiliary Energy Required Heating [GJ/yr]	36.4	37.8	35.7	37.2	37.1	35.4	36.8	34.6	36	36.4
Annual Energy DHW [GJ/yr]	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	24.5
Annual Energy Space Heating [GJ/yr]	38.5	40	37.8	39.4	39.3	37.5	38.9	36.7	38.2	38.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	91	92.5	90.2	91.9	91.7	89.9	91.4	89.2	90.6	89.2
Design Heating Load [W]	9440.2	9440.2	9305.9	9662.3	9305.9	9292.2	9292.2	9158	9158	9440.2
Annual Energy Electricity [kWh/yr]	7459.2	7466.7	7455.5	7463.7	7462.9	7453.8	7461.2	7450.1	7457.4	7459.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 992.16	$ 993.22	$ 991.64	$ 992.8	$ 992.69	$ 991.4	$ 992.44	$ 990.87	$ 991.91	$ 992.16
Annual Energy Natural Gas [m3/yr]	1722.2	1761.5	1702.3	1745.9	1741.4	1693.7	1732.6	1673.9	1712.5	1674.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 742.9	$ 759.85	$ 734.31	$ 753.12	$ 751.18	$ 730.6	$ 747.38	$ 722.06	$ 738.71	$ 722.41
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17893	17839	21025	15031	20971	18163	18109	21295	21241	17894
Upgrade Package List	Pkg2221101031	Pkg2221101021	Pkg2231101031	Pkg2211102031	Pkg2231101021	Pkg2221102031	Pkg2221102021	Pkg2231102031	Pkg2231102021	Pkg2221101031
GHGI [kg/m2]	33.07	33.81	32.69	33.51	33.43	32.53	33.26	32.16	32.89	32.18
% ICC	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	158	158	158	158	158	158	158	158	158	158
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	98.9	102.7	96.9	101.2	100.7	96.1	99.9	94.2	97.9	98.9
Output: MEUI [kWh/(m2 * yr)]	177.7	181.7	175.6	180.1	179.6	174.7	178.7	172.7	176.7	172.9
Output: Better than ERS (%)	2550.0%	2430.0%	2620.0%	2480.0%	2500.0%	2640.0%	2520.0%	2700.0%	2590.0%	2700.0%
Output: Better than Envelope (%)	1350.0%	1020.0%	1520.0%	1160.0%	1190.0%	1590.0%	1260.0%	1780.0%	1450.0%	1350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	506	499	510	502	502	512	504	515	508	506
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 71.36	$ 70.3	$ 71.88	$ 70.73	$ 70.84	$ 72.12	$ 71.08	$ 72.64	$ 71.61	$ 71.36
Annual savings in carbon tax for electricity [$/year]	$ .25	$ .25	$ .25	$ .25	$ .25	$ .26	$ .25	$ .26	$ .25	$ .25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 71.61	$ 70.55	$ 72.14	$ 70.98	$ 71.09	$ 72.38	$ 71.33	$ 72.9	$ 71.87	$ 71.61
Annual savings in GHG from electricity savings [kg CO2e/year]	5.6	5.5	5.6	5.5	5.5	5.6	5.5	5.7	5.6	5.6
Annual savings in natural gas [m3/year]	37.15	35.68	37.89	36.26	36.43	38.21	36.76	38.95	37.51	38.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 344.17	$ 330.6	$ 351.04	$ 335.99	$ 337.54	$ 354.01	$ 340.58	$ 360.84	$ 347.52	$ 360.57
Annual savings in carbon tax for natural gas [$/year]	$ 85.9	$ 82.52	$ 87.62	$ 83.86	$ 84.25	$ 88.36	$ 85.01	$ 90.06	$ 86.74	$ 90.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 430.07	$ 413.12	$ 438.66	$ 419.85	$ 421.79	$ 442.36	$ 425.58	$ 450.91	$ 434.26	$ 450.56
Annual savings in GHG from natural gas savings [kg CO2e/year]	1909	1833.7	1947.1	1863.6	1872.2	1963.5	1889	2001.4	1927.5	1999.9
Net Present Value [$]	$ 4,340.83	$ 3,940.31	$ 4,372.75	$ 3,949.87	$ 3,974.29	$ 4,307.47	$ 3,910.71	$ 4,338.42	$ 3,944.5	$ 4,188.77
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	8.82	10.61	10.61	10.61	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 105.02	$ 249.3	$.	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

SMALL Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 9,207.52	$ 9,349.24	$ 9,493.52	$ 9,545.42	$ 9,757.52	$ 8,463.24	$ 8,515.14	$ 9,899.24	$ 10,057.52	$ 8,607.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,829.7	$ 14,042.56	$ 14,259.27	$ 14,337.22	$ 14,655.8	$ 12,711.79	$ 12,789.74	$ 14,868.66	$ 15,106.4	$ 12,928.5
Net Present Value [$]	$ 7,124.15	$ 7,270.98	$ 7,127.69	$ 6,936.02	$ 7,341.01	$ 9,045.94	$ 8,651.06	$ 7,487.85	$ 7,419.25	$ 8,944.1
Incremental dollars per GHG saving	$ 2.14	$ 2.17	$ 2.21	$ 2.22	$ 2.23	$ 2.24	$ 2.25	$ 2.26	$ 2.27	$ 2.28
Auxiliary Energy Required Heating [GJ/yr]	37.5	37.2	36.4	37.9	37.5	36.4	37.8	37.2	37.5	35.7
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	14.7	26.3	26.3	14.7	13.7	26.3
Annual Energy Space Heating [GJ/yr]	21.5	21.3	21	21.6	21.5	21.3	21.9	21.3	21.5	21
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	68.7	68.7	68.3	68	67.2	79.4	78.7	67.2	66.2	79
Design Heating Load [W]	9022.5	9008.8	8874.5	8874.5	9022.5	9535.4	9535.4	9008.8	9022.5	9401.2
Annual Energy Electricity [kWh/yr]	14590.9	14592.9	14481.2	14386.6	14592.9	14741.5	14567.9	14594.9	14594.3	14645.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,001.3	$ 2,001.58	$ 1,985.77	$ 1,972.39	$ 2,001.58	$ 2,022.61	$ 1,998.04	$ 2,001.86	$ 2,001.78	$ 2,009.08
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	393.7	706.1	706.1	393.7	366.8	706.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 304.59	$ 304.59	$ 169.83	$ 158.22	$ 304.59
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	21037	18175	21307	21253	21038	17902	17848	18176	21039	21034
Upgrade Package List	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2231102021	Pkg2231101031	Pkg2221101031	Pkg2221101021	Pkg2221102031	Pkg2231101031	Pkg2231101031
GHGI [kg/m2]	9.7	9.7	9.69	9.68	8.95	14.82	14.8	8.95	8.44	14.81
% ICC	4.1%	4.1%	4.2%	4.2%	4.3%	3.8%	3.8%	4.4%	4.5%	3.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	158	158	158	158	158	158	158	158	158	158
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	101.9	101	99.1	103.1	101.9	98.9	102.7	101.1	102	96.9
Output: MEUI [kWh/(m2 * yr)]	114.6	114.5	113.4	113	110.5	143.2	142.2	110.4	107.8	142.3
Output: Better than ERS (%)	4190.0%	4190.0%	4220.0%	4250.0%	4310.0%	3620.0%	3670.0%	4310.0%	4400.0%	3650.0%
Output: Better than Envelope (%)	1090.0%	1160.0%	1350.0%	1000.0%	1090.0%	1350.0%	1020.0%	1160.0%	1090.0%	1520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6626	6628	6516	6421	6628	6776	6603	6630	6629	6681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 934.21	$ 934.49	$ 918.74	$ 905.4	$ 934.49	$ 955.44	$ 930.97	$ 934.77	$ 934.69	$ 941.96
Annual savings in carbon tax for electricity [$/year]	$ 3.31	$ 3.31	$ 3.26	$ 3.21	$ 3.31	$ 3.39	$ 3.3	$ 3.31	$ 3.31	$ 3.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 937.52	$ 937.81	$ 922.	$ 908.61	$ 937.81	$ 958.83	$ 934.27	$ 938.09	$ 938.	$ 945.3
Annual savings in GHG from electricity savings [kg CO2e/year]	72.9	72.9	71.7	70.6	72.9	74.5	72.6	72.9	72.9	73.5
Annual savings in natural gas [m3/year]	85.14	85.14	85.14	85.14	86.65	75.01	75.01	86.65	87.65	75.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 788.83	$ 788.83	$ 788.83	$ 788.83	$ 802.77	$ 694.93	$ 694.93	$ 802.77	$ 812.06	$ 694.93
Annual savings in carbon tax for natural gas [$/year]	$ 196.89	$ 196.89	$ 196.89	$ 196.89	$ 200.37	$ 173.45	$ 173.45	$ 200.37	$ 202.69	$ 173.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 985.71	$ 985.71	$ 985.71	$ 985.71	$ 1,003.14	$ 868.38	$ 868.38	$ 1,003.14	$ 1,014.74	$ 868.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	4375.3	4375.3	4375.3	4375.3	4452.6	3854.5	3854.5	4452.6	4504.1	3854.5
Net Present Value [$]	$ 7,124.15	$ 7,270.98	$ 7,127.69	$ 6,936.02	$ 7,341.01	$ 9,045.94	$ 8,651.06	$ 7,487.85	$ 7,419.25	$ 8,944.1
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	10.61	10.61	8.82	8.82	8.82	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

SMALL Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,057.52	$ 6,343.52	$ 6,199.24	$ 6,607.52	$ 6,893.52	$ 6,749.24	$ 6,907.52	$ 7,193.52	$ 7,049.24	$ 6,395.42
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,098.4	$ 9,527.97	$ 9,311.26	$ 9,924.5	$ 10,354.07	$ 10,137.36	$ 10,375.1	$ 10,804.67	$ 10,587.96	$ 9,605.92
Net Present Value [$]	$ 5,600.94	$ 5,571.89	$ 5,536.4	$ 5,384.7	$ 5,356.8	$ 5,321.13	$ 5,307.45	$ 5,278.58	$ 5,242.97	$ 5,151.28
Incremental dollars per GHG saving	$ 2.55	$ 2.61	$ 2.59	$ 2.69	$ 2.75	$ 2.73	$ 2.76	$ 2.81	$ 2.8	$ 2.72
Auxiliary Energy Required Heating [GJ/yr]	37.5	36.4	37.2	37.5	36.5	37.2	37.5	36.5	37.2	37.9
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	14.7	14.7	14.7	13.7	13.7	13.7	16.2
Annual Energy Space Heating [GJ/yr]	39.7	38.6	39.4	39.7	38.6	39.4	39.7	38.6	39.4	40.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	82	80.9	81.7	80.5	79.4	80.2	79.6	78.5	79.2	82.5
Design Heating Load [W]	8933	8785.1	8919.3	8933	8785.1	8919.3	8933	8785.1	8919.3	8785.1
Annual Energy Electricity [kWh/yr]	7465.1	7459.6	7463.4	7465.2	7459.7	7463.5	7465.2	7459.7	7463.6	7467.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.	$ 992.22	$ 992.76	$ 993.01	$ 992.23	$ 992.77	$ 993.01	$ 992.23	$ 992.78	$ 993.34
Annual Energy Natural Gas [m3/yr]	1481.1	1452.1	1472.4	1441.2	1412.1	1432.4	1414.6	1385.6	1405.9	1493.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 638.89	$ 626.39	$ 635.14	$ 621.68	$ 609.13	$ 617.89	$ 610.21	$ 597.7	$ 606.46	$ 644.33
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	21028	21298	18166	21029	21299	18167	21030	21300	18168	21244
Upgrade Package List	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2231102021
GHGI [kg/m2]	28.55	28.01	28.39	27.8	27.26	27.64	27.31	26.76	27.14	28.79
% ICC	2.7%	2.8%	2.7%	2.9%	3.1%	3.0%	3.1%	3.2%	3.1%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	140	140	140	140	140	140	140	140	140	140
Target MEUI cooling [kWh/(m2 * yr)]	158	158	158	158	158	158	158	158	158	158
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	101.9	99.1	101	101.9	99.1	101.1	102	99.1	101.1	103.1
Output: MEUI [kWh/(m2 * yr)]	153.3	150.3	152.4	149.3	146.3	148.4	146.6	143.6	145.7	154.6
Output: Better than ERS (%)	2970.0%	3070.0%	3000.0%	3100.0%	3200.0%	3130.0%	3180.0%	3270.0%	3210.0%	2930.0%
Output: Better than Envelope (%)	1090.0%	1350.0%	1160.0%	1090.0%	1330.0%	1160.0%	1090.0%	1330.0%	1160.0%	1000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	500	506	502	500	506	502	500	506	502	498
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 70.53	$ 71.3	$ 70.77	$ 70.51	$ 71.29	$ 70.75	$ 70.51	$ 71.29	$ 70.74	$ 70.19
Annual savings in carbon tax for electricity [$/year]	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 70.78	$ 71.56	$ 71.02	$ 70.76	$ 71.54	$ 71.	$ 70.76	$ 71.54	$ 70.99	$ 70.44
Annual savings in GHG from electricity savings [kg CO2e/year]	5.5	5.6	5.5	5.5	5.6	5.5	5.5	5.6	5.5	5.5
Annual savings in natural gas [m3/year]	46.13	47.21	46.45	47.62	48.7	47.94	48.61	49.69	48.93	45.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 427.4	$ 437.41	$ 430.4	$ 441.17	$ 451.22	$ 444.21	$ 450.35	$ 460.36	$ 453.36	$ 423.05
Annual savings in carbon tax for natural gas [$/year]	$ 106.68	$ 109.17	$ 107.43	$ 110.11	$ 112.62	$ 110.87	$ 112.41	$ 114.9	$ 113.16	$ 105.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 534.07	$ 546.58	$ 537.83	$ 551.28	$ 563.84	$ 555.08	$ 562.76	$ 575.27	$ 566.51	$ 528.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	2370.6	2426.1	2387.2	2447	2502.7	2463.8	2497.9	2553.4	2514.6	2346.5
Net Present Value [$]	$ 5,600.94	$ 5,571.89	$ 5,536.4	$ 5,384.7	$ 5,356.8	$ 5,321.13	$ 5,307.45	$ 5,278.58	$ 5,242.97	$ 5,151.28
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	10.61	8.82	10.61	10.61	8.82	10.61	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.	$ 850.	$.

SMALL Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 11,785.87	$ 11,821.87	$ 11,897.3	$ 11,927.59	$ 12,053.02	$ 12,071.87	$ 12,197.3	$ 12,371.87	$ 12,671.87	$ 13,191.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,702.38	$ 17,756.45	$ 17,869.74	$ 17,915.24	$ 18,103.64	$ 18,131.95	$ 18,320.34	$ 18,582.55	$ 19,033.15	$ 19,813.77
Net Present Value [$]	$ 10,304.62	$ 8,308.13	$ 9,942.71	$ 10,410.01	$ 10,142.15	$ 10,249.74	$ 9,978.96	$ 8,525.36	$ 8,603.41	$ 10,766.24
Incremental dollars per GHG saving	$ 2.99	$ 2.74	$ 3.07	$ 3.03	$ 3.06	$ 3.07	$ 3.1	$ 2.82	$ 2.86	$ 3.07
Auxiliary Energy Required Heating [GJ/yr]	32.5	33.2	32.9	32.2	33.6	31.5	32.9	33.2	33.3	33.5
Annual Energy DHW [GJ/yr]	23.4	16.2	24.5	23.4	23.4	23.4	23.4	14.7	13.7	16.2
Annual Energy Space Heating [GJ/yr]	19.3	19.3	19.4	19.2	19.7	18.8	19.4	19.3	19.3	19.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5
Total Energy [GJ/yr]	74.5	66.7	74.6	74.4	73.9	74	73.4	65.2	64.2	68.2
Design Heating Load [W]	9074.4	8547.8	8926.4	9060.7	9060.7	8926.4	8926.4	8547.8	8547.8	7718.8
Annual Energy Electricity [kWh/yr]	14196.8	14035.3	13910.5	14182.7	14029.9	14064.4	13910.5	14037.4	14038.8	14458.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,945.53	$ 1,922.68	$ 1,905.02	$ 1,943.54	$ 1,921.92	$ 1,926.8	$ 1,905.02	$ 1,922.98	$ 1,923.18	$ 1,982.51
Annual Energy Natural Gas [m3/yr]	627.1	434.1	658.6	627.1	627.1	627.1	627.1	393.7	366.8	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 270.51	$ 187.26	$ 284.1	$ 270.51	$ 270.51	$ 270.51	$ 270.51	$ 169.83	$ 158.22	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21144	21415	21359	18282	18228	21414	21360	21416	21417	18049
Upgrade Package List	Pkg2231101051	Pkg2231102051	Pkg2231102041	Pkg2221102051	Pkg2221102041	Pkg2231102051	Pkg2231102041	Pkg2231102051	Pkg2231102051	Pkg2221101053
GHGI [kg/m2]	13.28	9.64	13.84	13.28	13.26	13.26	13.25	8.89	8.38	9.69
% ICC	5.2%	5.2%	5.3%	5.3%	5.3%	5.4%	5.4%	5.5%	5.6%	5.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	88.5	90.3	89.3	87.6	91.2	85.7	89.3	90.4	90.4	91.1
Output: MEUI [kWh/(m2 * yr)]	129.8	109	130.8	129.6	128.7	128.5	127.6	104.9	102.2	112.9
Output: Better than ERS (%)	4010.0%	4360.0%	4000.0%	4020.0%	4060.0%	4050.0%	4100.0%	4480.0%	4570.0%	4230.0%
Output: Better than Envelope (%)	2280.0%	2110.0%	2190.0%	2350.0%	2020.0%	2520.0%	2190.0%	2110.0%	2090.0%	2040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6232	6070	5945	6217	6065	6099	5945	6072	6074	6493
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 878.64	$ 855.87	$ 838.27	$ 876.65	$ 855.11	$ 859.97	$ 838.27	$ 856.17	$ 856.36	$ 915.48
Annual savings in carbon tax for electricity [$/year]	$ 3.12	$ 3.04	$ 2.97	$ 3.11	$ 3.03	$ 3.05	$ 2.97	$ 3.04	$ 3.04	$ 3.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 881.76	$ 858.9	$ 841.25	$ 879.76	$ 858.14	$ 863.02	$ 841.25	$ 859.2	$ 859.4	$ 918.73
Annual savings in GHG from electricity savings [kg CO2e/year]	68.5	66.8	65.4	68.4	66.7	67.1	65.4	66.8	66.8	71.4
Annual savings in natural gas [m3/year]	77.95	85.14	76.78	77.95	77.95	77.95	77.95	86.65	87.65	85.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 722.2	$ 788.83	$ 711.33	$ 722.2	$ 722.2	$ 722.2	$ 722.2	$ 802.77	$ 812.06	$ 788.83
Annual savings in carbon tax for natural gas [$/year]	$ 180.26	$ 196.89	$ 177.54	$ 180.26	$ 180.26	$ 180.26	$ 180.26	$ 200.37	$ 202.69	$ 196.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 902.46	$ 985.71	$ 888.87	$ 902.46	$ 902.46	$ 902.46	$ 902.46	$ 1,003.14	$ 1,014.74	$ 985.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	4005.7	4375.3	3945.4	4005.7	4005.7	4005.7	4005.7	4452.6	4504.1	4375.3
Net Present Value [$]	$ 10,304.62	$ 8,308.13	$ 9,942.71	$ 10,410.01	$ 10,142.15	$ 10,249.74	$ 9,978.96	$ 8,525.36	$ 8,603.41	$ 10,766.24
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	10.61	10.61	10.61	10.61	10.61	10.61	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,990.09	$ 2,864.66	$ 2,990.09	$ 2,864.66	$ 2,990.09	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$.

SMALL Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,821.87	$ 12,371.87	$ 12,671.87	$ 11,785.87	$ 11,927.59	$ 12,053.02	$ 12,071.87	$ 13,191.59	$ 11,897.3	$ 12,197.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,756.45	$ 18,582.55	$ 19,033.15	$ 17,702.38	$ 17,915.24	$ 18,103.64	$ 18,131.95	$ 19,813.77	$ 17,869.74	$ 18,320.34
Net Present Value [$]	$ 8,308.13	$ 8,525.36	$ 8,603.41	$ 10,304.62	$ 10,410.01	$ 10,142.15	$ 10,249.74	$ 10,766.24	$ 9,942.71	$ 9,978.96
Incremental dollars per GHG saving	$ 2.74	$ 2.82	$ 2.86	$ 2.99	$ 3.03	$ 3.06	$ 3.07	$ 3.07	$ 3.07	$ 3.1
Auxiliary Energy Required Heating [GJ/yr]	33.2	33.2	33.3	32.5	32.2	33.6	31.5	33.5	32.9	32.9
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	23.4	23.4	23.4	23.4	16.2	24.5	23.4
Annual Energy Space Heating [GJ/yr]	19.3	19.3	19.3	19.3	19.2	19.7	18.8	19.4	19.4	19.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.5	0.5
Total Energy [GJ/yr]	66.7	65.2	64.2	74.5	74.4	73.9	74	68.2	74.6	73.4
Design Heating Load [W]	8547.8	8547.8	8547.8	9074.4	9060.7	9060.7	8926.4	7718.8	8926.4	8926.4
Annual Energy Electricity [kWh/yr]	14035.3	14037.4	14038.8	14196.8	14182.7	14029.9	14064.4	14458.1	13910.5	13910.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,922.68	$ 1,922.98	$ 1,923.18	$ 1,945.53	$ 1,943.54	$ 1,921.92	$ 1,926.8	$ 1,982.51	$ 1,905.02	$ 1,905.02
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	627.1	627.1	627.1	627.1	434.1	658.6	627.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 270.51	$ 270.51	$ 270.51	$ 270.51	$ 187.26	$ 284.1	$ 270.51
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21415	21416	21417	21144	18282	18228	21414	18049	21359	21360
Upgrade Package List	Pkg2231102051	Pkg2231102051	Pkg2231102051	Pkg2231101051	Pkg2221102051	Pkg2221102041	Pkg2231102051	Pkg2221101053	Pkg2231102041	Pkg2231102041
GHGI [kg/m2]	9.64	8.89	8.38	13.28	13.28	13.26	13.26	9.69	13.84	13.25
% ICC	5.2%	5.5%	5.6%	5.2%	5.3%	5.3%	5.4%	5.8%	5.3%	5.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	90.3	90.4	90.4	88.5	87.6	91.2	85.7	91.1	89.3	89.3
Output: MEUI [kWh/(m2 * yr)]	109	104.9	102.2	129.8	129.6	128.7	128.5	112.9	130.8	127.6
Output: Better than ERS (%)	4360.0%	4480.0%	4570.0%	4010.0%	4020.0%	4060.0%	4050.0%	4230.0%	4000.0%	4100.0%
Output: Better than Envelope (%)	2110.0%	2110.0%	2090.0%	2280.0%	2350.0%	2020.0%	2520.0%	2040.0%	2190.0%	2190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6070	6072	6074	6232	6217	6065	6099	6493	5945	5945
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 855.87	$ 856.17	$ 856.36	$ 878.64	$ 876.65	$ 855.11	$ 859.97	$ 915.48	$ 838.27	$ 838.27
Annual savings in carbon tax for electricity [$/year]	$ 3.04	$ 3.04	$ 3.04	$ 3.12	$ 3.11	$ 3.03	$ 3.05	$ 3.25	$ 2.97	$ 2.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 858.9	$ 859.2	$ 859.4	$ 881.76	$ 879.76	$ 858.14	$ 863.02	$ 918.73	$ 841.25	$ 841.25
Annual savings in GHG from electricity savings [kg CO2e/year]	66.8	66.8	66.8	68.5	68.4	66.7	67.1	71.4	65.4	65.4
Annual savings in natural gas [m3/year]	85.14	86.65	87.65	77.95	77.95	77.95	77.95	85.14	76.78	77.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 788.83	$ 802.77	$ 812.06	$ 722.2	$ 722.2	$ 722.2	$ 722.2	$ 788.83	$ 711.33	$ 722.2
Annual savings in carbon tax for natural gas [$/year]	$ 196.89	$ 200.37	$ 202.69	$ 180.26	$ 180.26	$ 180.26	$ 180.26	$ 196.89	$ 177.54	$ 180.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 985.71	$ 1,003.14	$ 1,014.74	$ 902.46	$ 902.46	$ 902.46	$ 902.46	$ 985.71	$ 888.87	$ 902.46
Annual savings in GHG from natural gas savings [kg CO2e/year]	4375.3	4452.6	4504.1	4005.7	4005.7	4005.7	4005.7	4375.3	3945.4	4005.7
Net Present Value [$]	$ 8,308.13	$ 8,525.36	$ 8,603.41	$ 10,304.62	$ 10,410.01	$ 10,142.15	$ 10,249.74	$ 10,766.24	$ 9,942.71	$ 9,978.96
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	10.61	10.61	8.82	10.61	10.61	10.61	8.82	10.61	10.61
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 396.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 25
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,990.09	$ 2,864.66	$ 2,864.66	$ 2,990.09	$ 2,990.09
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$.	$ 550.	$ 850.

SMALL Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 14,748.83	$ 14,757.48	$ 14,908.71	$ 14,932.48	$ 15,021.36	$ 14,948.83	$ 15,248.83	$ 15,024.71	$ 15,233.71	$ 15,089.43
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,152.74	$ 22,165.73	$ 22,392.88	$ 22,428.58	$ 22,562.08	$ 22,453.14	$ 22,903.74	$ 22,567.11	$ 22,881.03	$ 22,664.32
Net Present Value [$]	$ 748.5	$ 751.15	$ 789.65	$ 899.45	$ 918.32	$ 938.15	$ 1,015.4	$ 1,025.36	$ 1,039.17	$ 1,067.69
Incremental dollars per GHG saving	$ 4.87	$ 4.87	$ 4.88	$ 4.92	$ 4.92	$ 4.94	$ 4.95	$ 4.96	$ 4.96	$ 4.97
Auxiliary Energy Required Heating [GJ/yr]	27.6	27.6	27.2	27.5	27.2	26.7	26.7	27.6	26.8	27.5
Annual Energy DHW [GJ/yr]	13.7	13.7	13.7	13.7	13.7	14.7	13.7	13.7	13.7	13.7
Annual Energy Space Heating [GJ/yr]	29.3	29.2	28.8	29.1	28.8	28.3	28.3	29.3	28.4	29.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	70	70	69.5	69.9	69.6	70	69	70	69.2	69.9
Design Heating Load [W]	6297.9	6305.2	6400	6177.6	6334.6	6249.6	6249.6	6357.7	6361.3	6565
Annual Energy Electricity [kWh/yr]	7669.8	7669.7	7667.3	7669.1	7667.6	7664.8	7664.8	7669.8	7665.6	7669.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,021.96	$ 1,021.95	$ 1,021.61	$ 1,021.86	$ 1,021.65	$ 1,021.25	$ 1,021.25	$ 1,021.96	$ 1,021.37	$ 1,021.89
Annual Energy Natural Gas [m3/yr]	1138.6	1137.9	1125.2	1134.9	1127	1138.9	1112.3	1138.7	1116.7	1136.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 491.15	$ 490.85	$ 485.37	$ 489.56	$ 486.15	$ 491.28	$ 479.81	$ 491.2	$ 481.71	$ 490.12
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	47724	49146	45798	52512	51792	47741	47742	46428	45996	44052
Upgrade Package List	Pkg3341202053	Pkg3341403034	Pkg3331202054	Pkg4341402034	Pkg4331303034	Pkg3341202054	Pkg3341202054	Pkg3331302053	Pkg3331203054	Pkg3321203053
GHGI [kg/m2]	22.16	22.14	21.91	22.09	21.94	22.16	21.66	22.16	21.75	22.11
% ICC	6.5%	6.5%	6.6%	6.6%	6.7%	6.6%	6.8%	6.7%	6.8%	6.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target MEUI cooling [kWh/(m2 * yr)]	123	123	123	123	123	123	123	123	123	123
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.1	75	73.8	74.7	74	72.5	72.5	75.1	73	74.9
Output: MEUI [kWh/(m2 * yr)]	120.6	120.6	119.3	120.3	119.5	120.6	117.9	120.7	118.4	120.4
Output: Better than ERS (%)	4000.0%	4000.0%	4040.0%	4010.0%	4040.0%	4000.0%	4090.0%	4000.0%	4070.0%	4010.0%
Output: Better than Envelope (%)	3440.0%	3440.0%	3540.0%	3470.0%	3540.0%	3660.0%	3660.0%	3440.0%	3630.0%	3470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	296	296	298	296	298	300	300	296	300	296
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 41.67	$ 41.68	$ 42.02	$ 41.76	$ 41.98	$ 42.37	$ 42.37	$ 41.67	$ 42.26	$ 41.74
Annual savings in carbon tax for electricity [$/year]	$ .15	$ .15	$ .15	$ .15	$ .15	$ .15	$ .15	$ .15	$ .15	$ .15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 41.81	$ 41.83	$ 42.17	$ 41.91	$ 42.12	$ 42.52	$ 42.52	$ 41.81	$ 42.41	$ 41.88
Annual savings in GHG from electricity savings [kg CO2e/year]	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Annual savings in natural gas [m3/year]	58.89	58.92	59.39	59.03	59.32	58.88	59.87	58.89	59.71	58.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 545.63	$ 545.87	$ 550.26	$ 546.91	$ 549.63	$ 545.53	$ 554.71	$ 545.59	$ 553.19	$ 546.46
Annual savings in carbon tax for natural gas [$/year]	$ 136.19	$ 136.25	$ 137.34	$ 136.51	$ 137.19	$ 136.16	$ 138.45	$ 136.18	$ 138.07	$ 136.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 681.82	$ 682.12	$ 687.6	$ 683.41	$ 686.82	$ 681.69	$ 693.16	$ 681.77	$ 691.26	$ 682.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	3026.4	3027.7	3052	3033.5	3048.6	3025.8	3076.7	3026.2	3068.3	3031
Net Present Value [$]	$ 748.5	$ 751.15	$ 789.65	$ 899.45	$ 918.32	$ 938.15	$ 1,015.4	$ 1,025.36	$ 1,039.17	$ 1,067.69
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	14.09	10.61	10.61	14.09	10.61	10.61	10.61	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 682.	$ 1,507.	$ 682.	$ 682.	$ 1,507.	$ 682.	$ 682.	$ 682.	$ 1,507.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 536.31	$ 2,864.66	$ 536.31	$ 536.31	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 589.42	$ 589.42	$ 249.3	$ 589.42	$ 249.3	$ 589.42	$ 589.42	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	BC EffR10	BC EffR20	BC EffR10	BC EffR20	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 1,947.	$ 2,959.	$ 1,947.	$ 2,959.	$ 2,563.	$ 1,947.	$ 1,947.	$ 2,563.	$ 1,947.	$ 1,947.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.

SMALL Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR11 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,313.24	$ 5,365.14	$ 5,457.52	$ 5,494.22	$ 5,509.42	$ 5,599.24	$ 5,651.14	$ 5,743.52	$ 5,795.42	$ 5,863.24
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 7,980.49	$ 8,058.44	$ 8,197.2	$ 8,252.32	$ 8,275.15	$ 8,410.06	$ 8,488.01	$ 8,626.77	$ 8,704.72	$ 8,806.59
Net Present Value [$]	$ 5,587.09	$ 5,181.28	$ 5,635.14	$ 5,175.43	$ 5,232.19	$ 5,579.27	$ 5,177.23	$ 5,627.32	$ 5,227.89	$ 5,447.4
Incremental dollars per GHG saving	$ 2.44	$ 2.55	$ 2.46	$ 2.58	$ 2.57	$ 2.5	$ 2.61	$ 2.52	$ 2.63	$ 2.58
Auxiliary Energy Required Heating [GJ/yr]	43	44.5	42.3	44	43.7	41.9	43.3	41.1	42.5	43
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	24.8
Annual Energy Space Heating [GJ/yr]	45.6	47.1	44.8	46.6	46.3	44.4	45.9	43.6	45.1	45.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	98.4	99.9	97.6	99.4	99.1	97.2	98.7	96.4	97.9	96.6
Design Heating Load [W]	9837.1	9837.1	9695.1	10072.9	9695.1	9681.9	9681.9	9539.9	9539.9	9837.1
Annual Energy Electricity [kWh/yr]	7497	7504.6	7492.9	7502	7500.4	7491.1	7498.6	7487	7494.4	7497
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 997.51	$ 998.59	$ 996.93	$ 998.22	$ 997.99	$ 996.68	$ 997.74	$ 996.1	$ 997.14	$ 997.51
Annual Energy Natural Gas [m3/yr]	1917.9	1957.8	1896.2	1943.9	1935.8	1886.5	1926	1864.8	1904	1868.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 827.32	$ 844.53	$ 817.95	$ 838.53	$ 835.04	$ 813.77	$ 830.81	$ 804.41	$ 821.32	$ 806.18
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70669	70615	73801	67807	73747	70939	70885	74071	74017	70670
Upgrade Package List	Pkg2221101031	Pkg2221101021	Pkg2231101031	Pkg2211102031	Pkg2231101021	Pkg2221102031	Pkg2221102021	Pkg2231102031	Pkg2231102021	Pkg2221101031
GHGI [kg/m2]	36.74	37.49	36.33	37.23	37.07	36.15	36.89	35.74	36.48	35.82
% ICC	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	155	155	155	155	155	155	155	155	155	155
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	117	120.8	114.8	119.5	118.7	113.9	117.7	111.8	115.6	117
Output: MEUI [kWh/(m2 * yr)]	197.8	202	195.6	200.5	199.7	194.6	198.7	192.4	196.4	192.9
Output: Better than ERS (%)	2680.0%	2570.0%	2740.0%	2610.0%	2630.0%	2770.0%	2660.0%	2830.0%	2720.0%	2820.0%
Output: Better than Envelope (%)	1350.0%	1050.0%	1490.0%	1150.0%	1210.0%	1570.0%	1290.0%	1730.0%	1450.0%	1350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	538	530	542	533	534	544	536	548	540	538
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 75.8	$ 74.73	$ 76.38	$ 75.1	$ 75.32	$ 76.63	$ 75.58	$ 77.21	$ 76.17	$ 75.8
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .26	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 76.07	$ 74.99	$ 76.65	$ 75.36	$ 75.59	$ 76.91	$ 75.84	$ 77.49	$ 76.44	$ 76.07
Annual savings in GHG from electricity savings [kg CO2e/year]	5.9	5.8	6	5.9	5.9	6	5.9	6	5.9	5.9
Annual savings in natural gas [m3/year]	42.33	40.84	43.14	41.36	41.66	43.5	42.03	44.31	42.85	44.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 392.19	$ 378.41	$ 399.68	$ 383.21	$ 386.01	$ 403.03	$ 389.39	$ 410.52	$ 396.98	$ 409.1
Annual savings in carbon tax for natural gas [$/year]	$ 97.89	$ 94.45	$ 99.76	$ 95.65	$ 96.35	$ 100.59	$ 97.19	$ 102.46	$ 99.09	$ 102.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 490.07	$ 472.86	$ 499.43	$ 478.86	$ 482.35	$ 503.62	$ 486.58	$ 512.98	$ 496.07	$ 511.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	2175.3	2098.9	2216.8	2125.5	2141	2235.4	2159.8	2277	2201.9	2269.1
Net Present Value [$]	$ 5,587.09	$ 5,181.28	$ 5,635.14	$ 5,175.43	$ 5,232.19	$ 5,579.27	$ 5,177.23	$ 5,627.32	$ 5,227.89	$ 5,447.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	8.82	10.61	8.82	10.61	10.61	10.61	10.61	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 682.	$ 682.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 588.21	$ 536.31	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31	$ 588.21	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 105.02	$ 249.3	$.	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

SMALL Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 9,063.24	$ 9,207.52	$ 9,349.24	$ 9,613.24	$ 8,463.24	$ 9,493.52	$ 8,515.14	$ 9,545.42	$ 9,757.52	$ 8,607.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,612.99	$ 13,829.7	$ 14,042.56	$ 14,439.09	$ 12,711.79	$ 14,259.27	$ 12,789.74	$ 14,337.22	$ 14,655.8	$ 12,928.5
Net Present Value [$]	$ 8,107.65	$ 7,945.	$ 8,016.24	$ 8,313.9	$ 10,011.18	$ 7,849.22	$ 9,840.33	$ 7,834.11	$ 8,151.07	$ 9,796.68
Incremental dollars per GHG saving	$ 1.85	$ 1.88	$ 1.9	$ 1.93	$ 1.93	$ 1.93	$ 1.94	$ 1.94	$ 1.96	$ 1.96
Auxiliary Energy Required Heating [GJ/yr]	44.6	43.8	43.5	44.6	43	42.7	44.5	44.2	43.8	42.3
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	26.7	16.5	26.7	16.5	14.9	26.7
Annual Energy Space Heating [GJ/yr]	29.2	28.7	28.6	29.2	28.9	28.1	29.6	28.8	28.8	28.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	74.7	74.2	74.1	73.1	85.1	73.7	84.8	73.6	72.7	84.6
Design Heating Load [W]	9525.8	9383.8	9370.5	9525.8	9937.6	9228.5	9937.6	9228.5	9383.8	9795.6
Annual Energy Electricity [kWh/yr]	16159.9	16040.7	16013.3	16162.7	16242.8	15892.4	16156.3	15866.4	16043.4	16103.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,223.31	$ 2,206.44	$ 2,202.57	$ 2,223.71	$ 2,235.04	$ 2,185.46	$ 2,222.8	$ 2,181.78	$ 2,206.83	$ 2,215.33
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	400.7	716	442.6	716	442.6	400.7	716
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 308.86	$ 190.92	$ 308.86	$ 190.92	$ 172.85	$ 308.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70681	73813	70951	70682	70678	74083	70624	74029	73814	73810
Upgrade Package List	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221101021	Pkg2231102021	Pkg2231101031	Pkg2231101031
GHGI [kg/m2]	10.03	10.02	10.02	9.25	15.16	10	15.15	10	9.23	15.15
% ICC	4.0%	4.1%	4.1%	4.3%	3.8%	4.2%	3.8%	4.2%	4.3%	3.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	155	155	155	155	155	155	155	155	155	155
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	121.3	119.1	118.1	121.3	117	116	120.8	120.1	119.2	114.8
Output: MEUI [kWh/(m2 * yr)]	132	130.9	130.5	127.8	160.2	129.3	159.9	129.5	126.6	158.9
Output: Better than ERS (%)	4200.0%	4240.0%	4250.0%	4320.0%	3700.0%	4280.0%	3720.0%	4290.0%	4360.0%	3740.0%
Output: Better than Envelope (%)	1030.0%	1190.0%	1250.0%	1030.0%	1350.0%	1410.0%	1050.0%	1110.0%	1190.0%	1490.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8125	8006	7979	8128	8208	7858	8122	7832	8009	8069
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,145.67	$ 1,128.86	$ 1,125.	$ 1,146.06	$ 1,157.36	$ 1,107.95	$ 1,145.16	$ 1,104.28	$ 1,129.24	$ 1,137.71
Annual savings in carbon tax for electricity [$/year]	$ 4.06	$ 4.	$ 3.99	$ 4.06	$ 4.1	$ 3.93	$ 4.06	$ 3.92	$ 4.	$ 4.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,149.73	$ 1,132.86	$ 1,128.99	$ 1,150.13	$ 1,161.46	$ 1,111.88	$ 1,149.22	$ 1,108.2	$ 1,133.25	$ 1,141.75
Annual savings in GHG from electricity savings [kg CO2e/year]	89.4	88.1	87.8	89.4	90.3	86.4	89.3	86.1	88.1	88.8
Annual savings in natural gas [m3/year]	97.3	97.3	97.3	98.86	87.11	97.3	87.11	97.3	98.86	87.11
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 901.47	$ 901.47	$ 901.47	$ 915.93	$ 807.09	$ 901.47	$ 807.09	$ 901.47	$ 915.93	$ 807.09
Annual savings in carbon tax for natural gas [$/year]	$ 225.	$ 225.	$ 225.	$ 228.61	$ 201.45	$ 225.	$ 201.45	$ 225.	$ 228.61	$ 201.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,126.47	$ 1,126.47	$ 1,126.47	$ 1,144.54	$ 1,008.53	$ 1,126.47	$ 1,008.53	$ 1,126.47	$ 1,144.54	$ 1,008.53
Annual savings in GHG from natural gas savings [kg CO2e/year]	5000	5000	5000	5080.3	4476.6	5000	4476.6	5000	5080.3	4476.6
Net Present Value [$]	$ 8,107.65	$ 7,945.	$ 8,016.24	$ 8,313.9	$ 10,011.18	$ 7,849.22	$ 9,840.33	$ 7,834.11	$ 8,151.07	$ 9,796.68
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	8.82	8.82	10.61	8.82	10.61	8.82	8.82
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 396.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 588.21	$ 588.21	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$.	$ 550.	$.

SMALL Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,057.52	$ 6,343.52	$ 5,913.24	$ 6,199.24	$ 6,607.52	$ 6,893.52	$ 6,463.24	$ 6,749.24	$ 6,907.52	$ 7,193.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,098.4	$ 9,527.97	$ 8,881.69	$ 9,311.26	$ 9,924.5	$ 10,354.07	$ 9,707.79	$ 10,137.36	$ 10,375.1	$ 10,804.67
Net Present Value [$]	$ 6,937.72	$ 6,934.39	$ 6,886.09	$ 6,882.58	$ 6,733.55	$ 6,730.04	$ 6,680.76	$ 6,678.41	$ 6,663.45	$ 6,660.31
Incremental dollars per GHG saving	$ 2.28	$ 2.33	$ 2.26	$ 2.31	$ 2.41	$ 2.46	$ 2.4	$ 2.45	$ 2.47	$ 2.52
Auxiliary Energy Required Heating [GJ/yr]	43.8	42.7	44.6	43.5	43.8	42.7	44.6	43.5	43.9	42.7
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	14.9	14.9	14.9	13.9	13.9
Annual Energy Space Heating [GJ/yr]	46.4	45.2	47.3	46	46.4	45.2	47.3	46.1	46.4	45.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	89.1	87.9	89.9	88.7	87.5	86.3	88.4	87.2	86.5	85.3
Design Heating Load [W]	9289.2	9134	9431.2	9276	9289.2	9134	9431.2	9276	9289.2	9134
Annual Energy Electricity [kWh/yr]	7501.2	7495.2	7505.4	7499.4	7501.3	7495.3	7505.5	7499.5	7501.4	7495.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 998.1	$ 997.26	$ 998.7	$ 997.85	$ 998.12	$ 997.27	$ 998.71	$ 997.86	$ 998.13	$ 997.27
Annual Energy Natural Gas [m3/yr]	1666.5	1634.6	1688.6	1656.7	1625.2	1593.3	1647.4	1615.4	1597.7	1565.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 718.87	$ 705.11	$ 728.4	$ 714.64	$ 701.05	$ 687.29	$ 710.63	$ 696.83	$ 689.19	$ 675.43
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	73804	74074	70672	70942	73805	74075	70673	70943	73806	74076
Upgrade Package List	Pkg2231101031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031
GHGI [kg/m2]	32.03	31.43	32.44	31.85	31.26	30.66	31.67	31.07	30.74	30.14
% ICC	2.7%	2.8%	2.6%	2.7%	2.9%	3.1%	2.9%	3.0%	3.1%	3.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	155	155	155	155	155	155	155	155	155	155
Target MEUI cooling [kWh/(m2 * yr)]	173	173	173	173	173	173	173	173	173	173
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	119.1	116	121.3	118.1	119.2	116	121.3	118.2	119.2	116.1
Output: MEUI [kWh/(m2 * yr)]	172.4	169.1	174.7	171.4	168.3	165	170.5	167.3	165.5	162.2
Output: Better than ERS (%)	3080.0%	3180.0%	3020.0%	3110.0%	3210.0%	3300.0%	3140.0%	3230.0%	3280.0%	3380.0%
Output: Better than Envelope (%)	1190.0%	1410.0%	1030.0%	1250.0%	1190.0%	1410.0%	1030.0%	1250.0%	1170.0%	1410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	533	539	529	535	533	539	529	535	533	539
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 75.21	$ 76.06	$ 74.62	$ 75.46	$ 75.2	$ 76.04	$ 74.6	$ 75.45	$ 75.18	$ 76.04
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .27	$ .26	$ .27	$ .27	$ .27	$ .26	$ .27	$ .27	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 75.48	$ 76.33	$ 74.88	$ 75.73	$ 75.46	$ 76.31	$ 74.87	$ 75.72	$ 75.45	$ 76.31
Annual savings in GHG from electricity savings [kg CO2e/year]	5.9	5.9	5.8	5.9	5.9	5.9	5.8	5.9	5.9	5.9
Annual savings in natural gas [m3/year]	51.7	52.89	50.87	52.06	53.24	54.42	52.41	53.6	54.26	55.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 478.97	$ 489.98	$ 471.34	$ 482.35	$ 493.23	$ 504.24	$ 485.56	$ 496.61	$ 502.72	$ 513.73
Annual savings in carbon tax for natural gas [$/year]	$ 119.55	$ 122.3	$ 117.64	$ 120.39	$ 123.11	$ 125.86	$ 121.19	$ 123.95	$ 125.48	$ 128.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 598.52	$ 612.28	$ 588.99	$ 602.75	$ 616.33	$ 630.1	$ 606.76	$ 620.56	$ 628.2	$ 641.96
Annual savings in GHG from natural gas savings [kg CO2e/year]	2656.6	2717.7	2614.3	2675.4	2735.7	2796.8	2693.2	2754.5	2788.4	2849.4
Net Present Value [$]	$ 6,937.72	$ 6,934.39	$ 6,886.09	$ 6,882.58	$ 6,733.55	$ 6,730.04	$ 6,680.76	$ 6,678.41	$ 6,663.45	$ 6,660.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	10.61	8.82	10.61	8.82	10.61	8.82	10.61	8.82	10.61
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.	$ 396.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.

SMALL Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHRSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,341.59	$ 11,485.87	$ 11,627.59	$ 11,641.59	$ 11,753.02	$ 11,771.87	$ 11,785.87	$ 11,814.08	$ 11,821.87	$ 11,897.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,035.07	$ 17,251.78	$ 17,464.64	$ 17,485.67	$ 17,653.04	$ 17,681.35	$ 17,702.38	$ 17,744.75	$ 17,756.45	$ 17,869.74
Net Present Value [$]	$ 10,927.61	$ 10,692.11	$ 10,753.13	$ 10,953.66	$ 10,683.74	$ 10,540.09	$ 10,718.17	$ 3,587.71	$ 8,637.46	$ 10,478.74
Incremental dollars per GHG saving	$ 2.53	$ 2.56	$ 2.59	$ 2.56	$ 2.62	$ 2.62	$ 2.59	$ 3.55	$ 2.4	$ 2.65
Auxiliary Energy Required Heating [GJ/yr]	39.5	38.7	38.4	39.5	39.7	37.6	38.7	33.8	39.1	38.9
Annual Energy DHW [GJ/yr]	24.8	24.8	24.8	23.6	24.8	24.8	23.6	13.9	16.5	24.8
Annual Energy Space Heating [GJ/yr]	26.8	26.3	26.1	26.8	26.8	25.7	26.3	35.8	25.9	26.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.5	0.5
Total Energy [GJ/yr]	81.1	80.6	80.5	79.9	80.2	80	79.4	76.8	71.5	79.7
Design Heating Load [W]	9594.7	9452.7	9439.5	9594.7	9439.5	9297.5	9452.7	7176.3	8885.7	9297.5
Annual Energy Electricity [kWh/yr]	15640.1	15492.6	15461.3	15640.1	15385.6	15322.5	15492.6	7702.6	15294.2	15249.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,149.76	$ 2,128.89	$ 2,124.46	$ 2,149.76	$ 2,113.75	$ 2,104.82	$ 2,128.89	$ 1,026.6	$ 2,100.81	$ 2,094.55
Annual Energy Natural Gas [m3/yr]	667	667	667	634.3	667	667	634.3	1317.3	442.6	667
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 287.72	$ 287.72	$ 287.72	$ 273.61	$ 287.72	$ 287.72	$ 273.61	$ 568.24	$ 190.92	$ 287.72
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70787	73919	71057	70788	71003	74189	73920	52836	74191	74135
Upgrade Package List	Pkg2221101051	Pkg2231101051	Pkg2221102051	Pkg2221101051	Pkg2221102041	Pkg2231102051	Pkg2231101051	Pkg11111010Test4	Pkg2231102051	Pkg2231102041
GHGI [kg/m2]	14.18	14.16	14.16	13.57	14.15	14.15	13.55	25.51	9.94	14.14
% ICC	5.0%	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 0 6	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	107.3	105.2	104.3	107.3	108	102.2	105.2	91.9	106.2	105.8
Output: MEUI [kWh/(m2 * yr)]	149.4	147.9	147.6	146.1	147.4	146.3	144.6	139.1	123.5	146.1
Output: Better than ERS (%)	4000.0%	4030.0%	4040.0%	4090.0%	4060.0%	4080.0%	4120.0%	4040.0%	4450.0%	4100.0%
Output: Better than Envelope (%)	2050.0%	2210.0%	2270.0%	2050.0%	2010.0%	2430.0%	2210.0%	3200.0%	2130.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7606	7458	7427	7606	7351	7288	7458	332	7260	7215
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,072.38	$ 1,051.58	$ 1,047.16	$ 1,072.38	$ 1,036.49	$ 1,027.59	$ 1,051.58	$ 46.81	$ 1,023.6	$ 1,017.36
Annual savings in carbon tax for electricity [$/year]	$ 3.8	$ 3.73	$ 3.71	$ 3.8	$ 3.68	$ 3.64	$ 3.73	$ .17	$ 3.63	$ 3.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,076.18	$ 1,055.31	$ 1,050.88	$ 1,076.18	$ 1,040.17	$ 1,031.24	$ 1,055.31	$ 46.98	$ 1,027.23	$ 1,020.96
Annual savings in GHG from electricity savings [kg CO2e/year]	83.7	82	81.7	83.7	80.9	80.2	82	3.7	79.9	79.4
Annual savings in natural gas [m3/year]	88.94	88.94	88.94	90.16	88.94	88.94	90.16	64.71	97.3	88.94
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 824.	$ 824.	$ 824.	$ 835.29	$ 824.	$ 824.	$ 835.29	$ 599.52	$ 901.47	$ 824.
Annual savings in carbon tax for natural gas [$/year]	$ 205.67	$ 205.67	$ 205.67	$ 208.48	$ 205.67	$ 205.67	$ 208.48	$ 149.64	$ 225.	$ 205.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,029.67	$ 1,029.67	$ 1,029.67	$ 1,043.77	$ 1,029.67	$ 1,029.67	$ 1,043.77	$ 749.15	$ 1,126.47	$ 1,029.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	4570.4	4570.4	4570.4	4633	4570.4	4570.4	4633	3325.2	5000	4570.4
Net Present Value [$]	$ 10,927.61	$ 10,692.11	$ 10,753.13	$ 10,953.66	$ 10,683.74	$ 10,540.09	$ 10,718.17	$ 3,587.71	$ 8,637.46	$ 10,478.74
ECM Details Envelope Components										
Attic Ceiling RSI	8.82	8.82	10.61	8.82	10.61	10.61	8.82	14.09	10.61	10.61
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 396.	$ 396.	$ 682.	$ 396.	$ 682.	$ 682.	$ 396.	$ 1,507.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,990.09	$ 2,864.66	$ 2,864.66	$ 536.31	$ 2,864.66	$ 2,990.09
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,665.75	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 105.02	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 249.3
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$ 550.

SMALL Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,821.87	$ 12,371.87	$ 12,671.87	$ 11,341.59	$ 11,485.87	$ 11,641.59	$ 11,785.87	$ 11,627.59	$ 11,753.02	$ 11,927.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,756.45	$ 18,582.55	$ 19,033.15	$ 17,035.07	$ 17,251.78	$ 17,485.67	$ 17,702.38	$ 17,464.64	$ 17,653.04	$ 17,915.24
Net Present Value [$]	$ 8,637.46	$ 8,843.53	$ 8,915.52	$ 10,927.61	$ 10,692.11	$ 10,953.66	$ 10,718.17	$ 10,753.13	$ 10,683.74	$ 10,779.18
Incremental dollars per GHG saving	$ 2.4	$ 2.47	$ 2.51	$ 2.53	$ 2.56	$ 2.56	$ 2.59	$ 2.59	$ 2.62	$ 2.62
Auxiliary Energy Required Heating [GJ/yr]	39.1	39.1	39.1	39.5	38.7	39.5	38.7	38.4	39.7	38.4
Annual Energy DHW [GJ/yr]	16.5	14.9	13.9	24.8	24.8	23.6	23.6	24.8	24.8	23.6
Annual Energy Space Heating [GJ/yr]	25.9	25.9	25.9	26.8	26.3	26.8	26.3	26.1	26.8	26.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Energy [GJ/yr]	71.5	70	69	81.1	80.6	79.9	79.4	80.5	80.2	79.3
Design Heating Load [W]	8885.7	8885.7	8885.7	9594.7	9452.7	9594.7	9452.7	9439.5	9439.5	9439.5
Annual Energy Electricity [kWh/yr]	15294.2	15296.9	15298.8	15640.1	15492.6	15640.1	15492.6	15461.3	15385.6	15461.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,100.81	$ 2,101.2	$ 2,101.47	$ 2,149.76	$ 2,128.89	$ 2,149.76	$ 2,128.89	$ 2,124.46	$ 2,113.75	$ 2,124.46
Annual Energy Natural Gas [m3/yr]	442.6	400.7	372.9	667	667	634.3	634.3	667	667	634.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 172.85	$ 160.86	$ 287.72	$ 287.72	$ 273.61	$ 273.61	$ 287.72	$ 287.72	$ 273.61
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	74191	74192	74193	70787	73919	70788	73920	71057	71003	71058
Upgrade Package List	Pkg2231102051	Pkg2231102051	Pkg2231102051	Pkg2221101051	Pkg2231101051	Pkg2221101051	Pkg2231101051	Pkg2221102051	Pkg2221102041	Pkg2221102051
GHGI [kg/m2]	9.94	9.15	8.63	14.18	14.16	13.57	13.55	14.16	14.15	13.55
% ICC	5.2%	5.5%	5.6%	5.0%	5.1%	5.2%	5.2%	5.2%	5.2%	5.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	106.2	106.2	106.3	107.3	105.2	107.3	105.2	104.3	108	104.3
Output: MEUI [kWh/(m2 * yr)]	123.5	119.3	116.5	149.4	147.9	146.1	144.6	147.6	147.4	144.3
Output: Better than ERS (%)	4450.0%	4570.0%	4640.0%	4000.0%	4030.0%	4090.0%	4120.0%	4040.0%	4060.0%	4130.0%
Output: Better than Envelope (%)	2130.0%	2130.0%	2130.0%	2050.0%	2210.0%	2050.0%	2210.0%	2270.0%	2010.0%	2270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7260	7262	7264	7606	7458	7606	7458	7427	7351	7427
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,023.6	$ 1,023.98	$ 1,024.25	$ 1,072.38	$ 1,051.58	$ 1,072.38	$ 1,051.58	$ 1,047.16	$ 1,036.49	$ 1,047.16
Annual savings in carbon tax for electricity [$/year]	$ 3.63	$ 3.63	$ 3.63	$ 3.8	$ 3.73	$ 3.8	$ 3.73	$ 3.71	$ 3.68	$ 3.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,027.23	$ 1,027.62	$ 1,027.88	$ 1,076.18	$ 1,055.31	$ 1,076.18	$ 1,055.31	$ 1,050.88	$ 1,040.17	$ 1,050.88
Annual savings in GHG from electricity savings [kg CO2e/year]	79.9	79.9	79.9	83.7	82	83.7	82	81.7	80.9	81.7
Annual savings in natural gas [m3/year]	97.3	98.86	99.89	88.94	88.94	90.16	90.16	88.94	88.94	90.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 901.47	$ 915.93	$ 925.53	$ 824.	$ 824.	$ 835.29	$ 835.29	$ 824.	$ 824.	$ 835.29
Annual savings in carbon tax for natural gas [$/year]	$ 225.	$ 228.61	$ 231.01	$ 205.67	$ 205.67	$ 208.48	$ 208.48	$ 205.67	$ 205.67	$ 208.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,126.47	$ 1,144.54	$ 1,156.53	$ 1,029.67	$ 1,029.67	$ 1,043.77	$ 1,043.77	$ 1,029.67	$ 1,029.67	$ 1,043.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	5000	5080.3	5133.5	4570.4	4570.4	4633	4633	4570.4	4570.4	4633
Net Present Value [$]	$ 8,637.46	$ 8,843.53	$ 8,915.52	$ 10,927.61	$ 10,692.11	$ 10,953.66	$ 10,718.17	$ 10,753.13	$ 10,683.74	$ 10,779.18
ECM Details Envelope Components										
Attic Ceiling RSI	10.61	10.61	10.61	8.82	8.82	8.82	8.82	10.61	10.61	10.61
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 682.	$ 682.	$ 682.	$ 396.	$ 396.	$ 396.	$ 396.	$ 682.	$ 682.	$ 682.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 25	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,864.66	$ 2,990.09	$ 2,864.66
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91	$ 3,025.91
Foundation Wall Interior Insulation Cost of Upgrade	$ 249.3	$ 249.3	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 249.3	$ 105.02	$ 105.02	$ 105.02
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.

SMALL Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k	small.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,814.08	$ 13,745.48	$ 14,021.36	$ 14,036.48	$ 14,092.36	$ 14,196.36	$ 14,108.71	$ 14,257.48	$ 14,408.71	$ 14,361.48
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,744.75	$ 20,645.71	$ 21,060.08	$ 21,082.79	$ 21,166.72	$ 21,322.93	$ 21,191.28	$ 21,414.73	$ 21,641.88	$ 21,570.94
Net Present Value [$]	$ 3,587.71	$ 1,582.84	$ 1,306.96	$ 1,266.84	$ 1,218.12	$ 1,198.46	$ 1,183.55	$ 1,116.89	$ 1,113.64	$ 1,094.37
Incremental dollars per GHG saving	$ 3.55	$ 4.15	$ 4.23	$ 4.24	$ 4.26	$ 4.27	$ 4.27	$ 4.29	$ 4.3	$ 4.3
Auxiliary Energy Required Heating [GJ/yr]	33.8	34.1	34.1	34.2	34.2	33.8	33.3	33.9	33.3	33.6
Annual Energy DHW [GJ/yr]	13.9	13.9	13.9	13.9	13.9	13.9	14.9	13.9	13.9	13.9
Annual Energy Space Heating [GJ/yr]	35.8	36.1	36.1	36.2	36.2	35.8	35.3	35.9	35.3	35.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	76.8	77.1	77.1	77.2	77.2	76.8	77.3	76.9	76.3	76.6
Design Heating Load [W]	7176.3	6761.1	6829	6574.1	6648.5	6685.5	6718.8	6626.8	6718.8	6667
Annual Energy Electricity [kWh/yr]	7702.6	7704.1	7704.1	7704.7	7704.5	7702.7	7699.9	7703.2	7700	7701.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,026.6	$ 1,026.82	$ 1,026.82	$ 1,026.9	$ 1,026.87	$ 1,026.62	$ 1,026.22	$ 1,026.69	$ 1,026.23	$ 1,026.43
Annual Energy Natural Gas [m3/yr]	1317.3	1325.6	1325.6	1328.4	1327.6	1318.1	1331.2	1320.4	1303.7	1311.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 568.24	$ 571.82	$ 571.82	$ 573.03	$ 572.68	$ 568.58	$ 574.23	$ 569.57	$ 562.37	$ 565.61
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	52836	100626	99330	104982	104694	104424	98555	101904	98556	101274
Upgrade Package List	Pkg1111010Test4	Pkg3341203034	Pkg3313303034	Pkg4341302033	Pkg4331402033	Pkg4331302034	Pkg3331202053	Pkg3341403033	Pkg3331202053	Pkg3341303034
GHGI [kg/m2]	25.51	25.66	25.66	25.72	25.7	25.52	25.77	25.57	25.25	25.39
% ICC	5.2%	6.1%	6.2%	6.2%	6.2%	6.3%	6.3%	6.3%	6.4%	6.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target MEUI cooling [kWh/(m2 * yr)]	138	138	138	138	138	138	138	138	138	138
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	91.9	92.7	92.7	93	92.9	92	90.5	92.2	90.6	91.3
Output: MEUI [kWh/(m2 * yr)]	139.1	139.9	139.9	140.2	140.1	139.1	140.4	139.4	137.7	138.4
Output: Better than ERS (%)	4040.0%	4010.0%	4010.0%	4010.0%	4010.0%	4040.0%	4000.0%	4030.0%	4080.0%	4050.0%
Output: Better than Envelope (%)	3200.0%	3140.0%	3140.0%	3120.0%	3120.0%	3200.0%	3300.0%	3180.0%	3300.0%	3240.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	332	330	330	330	330	332	335	331	335	333
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 46.81	$ 46.6	$ 46.6	$ 46.52	$ 46.54	$ 46.8	$ 47.19	$ 46.73	$ 47.18	$ 46.98
Annual savings in carbon tax for electricity [$/year]	$ .17	$ .17	$ .17	$ .16	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 46.98	$ 46.77	$ 46.77	$ 46.68	$ 46.71	$ 46.96	$ 47.36	$ 46.89	$ 47.35	$ 47.15
Annual savings in GHG from electricity savings [kg CO2e/year]	3.7	3.6	3.6	3.6	3.6	3.7	3.7	3.6	3.7	3.7
Annual savings in natural gas [m3/year]	64.71	64.4	64.4	64.29	64.32	64.68	64.19	64.59	65.21	64.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 599.52	$ 596.65	$ 596.65	$ 595.68	$ 595.96	$ 599.24	$ 594.72	$ 598.45	$ 604.21	$ 601.62
Annual savings in carbon tax for natural gas [$/year]	$ 149.64	$ 148.92	$ 148.92	$ 148.68	$ 148.75	$ 149.57	$ 148.44	$ 149.37	$ 150.81	$ 150.16
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 749.15	$ 745.57	$ 745.57	$ 744.36	$ 744.71	$ 748.81	$ 743.16	$ 747.81	$ 755.02	$ 751.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	3325.2	3309.4	3309.4	3304	3305.5	3323.7	3298.6	3319.3	3351.3	3336.9
Net Present Value [$]	$ 3,587.71	$ 1,582.84	$ 1,306.96	$ 1,266.84	$ 1,218.12	$ 1,198.46	$ 1,183.55	$ 1,116.89	$ 1,113.64	$ 1,094.37
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	10.61	10.61	10.61	10.61	14.09	10.61	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,507.	$ 1,507.	$ 1,507.	$ 682.	$ 682.	$ 682.	$ 682.	$ 1,507.	$ 682.	$ 1,507.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 536.31	$ 2,864.66	$ 536.31	$ 2,864.66	$ 536.31
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75	$ 3,665.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 105.02	$ 589.42	$ 249.3	$ 589.42	$ 249.3	$ 249.3	$ 249.3	$ 589.42	$ 249.3	$ 589.42
Foundation Slab Below Grade Code	NA	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR10	BC EffR20	BC EffR10	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$.	$ 1,947.	$ 2,563.	$ 2,563.	$ 2,959.	$ 2,563.	$ 1,947.	$ 2,959.	$ 1,947.	$ 2,563.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.

MEDIUM Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 5,670.87	$ 5,891.61	$ 5,941.61	$ 5,985.8	$ 6,020.87	$ 6,035.8	$ 6,165.61	$ 6,206.54	$ 6,220.87	$ 6,241.61
ICC with multiplier (Van=1.0,this Cz =1)	$ 5,670.87	$ 5,891.61	$ 5,941.61	$ 5,985.8	$ 6,020.87	$ 6,035.8	$ 6,165.61	$ 6,206.54	$ 6,220.87	$ 6,241.61
Net Present Value [$]	$ 270.7	$ 133.39	$ 222.57	$ 56.85	$ 229.23	$ 298.92	$ 4,095.08	$ 82.16	$ 37.32	$ 367.52
Incremental dollars per GHG saving	$ 5.27	$ 5.39	$ 5.77	$ 5.46	$ 5.75	$ 5.84	$ 4.22	$ 5.57	$ 5.5	$ 5.86
Auxiliary Energy Required Heating [GJ/yr]	25.4	25.1	27.3	25	27.7	27.3	30.8	24.7	25.5	27.3
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	7.8	13.5	12.4	11.7
Annual Energy Space Heating [GJ/yr]	27	26.6	29	26.5	29.3	28.9	32.6	26.2	27	29
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	66.8	66.5	67.7	66.4	67.4	67.6	66.8	66	65.7	67
Design Heating Load [W]	5634.3	5580	5954.9	5588.2	6009.3	5963.1	6078.2	5533.9	5634.3	5954.9
Annual Energy Electricity [kWh/yr]	7459.7	7457.9	7469.7	7457.6	7471.5	7469.3	9658.1	7455.8	7459.8	7469.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 992.23	$ 991.98	$ 993.65	$ 991.94	$ 993.9	$ 993.59	$ 1,303.31	$ 991.68	$ 992.25	$ 993.65
Annual Energy Natural Gas [m3/yr]	1073	1063.6	1096.5	1061.6	1087.3	1094.5	859.5	1052.4	1044.1	1078
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 462.85	$ 458.8	$ 472.99	$ 457.94	$ 469.02	$ 472.13	$ 370.76	$ 453.97	$ 450.39	$ 465.01
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11344	11614	1895	12964	1626	3245	1897	13234	11345	1896
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg1121102011	Pkg2131101011	Pkg1121101011	Pkg1131101011	Pkg1121102011	Pkg2131102011	Pkg2121101011	Pkg1121102011
GHGI [kg/m2]	9.11	9.04	9.31	9.02	9.23	9.29	7.47	8.95	8.88	9.16
% ICC	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	30.2	29.8	32.4	29.7	32.8	32.3	36.5	29.3	30.2	32.4
Output: MEUI [kWh/(m2 * yr)]	48.8	48.4	49.9	48.3	49.5	49.8	48.8	47.9	47.5	49.1
Output: Better than ERS (%)	1200.0%	1240.0%	1080.0%	1250.0%	1120.0%	1090.0%	1190.0%	1300.0%	1340.0%	1170.0%
Output: Better than Envelope (%)	330.0%	200.0%	1100.0%	160.0%	1260.0%	1100.0%	2520.0%	40.0%	370.0%	1100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	490	491	480	492	478	480	1709	493	489	480
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 69.02	$ 69.27	$ 67.61	$ 69.32	$ 67.36	$ 67.67	$ 240.95	$ 69.57	$ 69.01	$ 67.61
Annual savings in carbon tax for electricity [$/year]	$ .24	$ .25	$ .24	$ .25	$ .24	$ .24	$ .85	$ .25	$ .24	$ .24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 69.26	$ 69.52	$ 67.85	$ 69.56	$ 67.59	$ 67.91	$ 241.81	$ 69.82	$ 69.25	$ 67.85
Annual savings in GHG from electricity savings [kg CO2e/year]	5.4	5.4	5.3	5.4	5.3	5.3	18.8	5.4	5.4	5.3
Annual savings in natural gas [m3/year]	20.82	21.17	19.95	21.25	20.29	20.02	28.78	21.59	21.9	20.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 192.93	$ 196.18	$ 184.82	$ 196.87	$ 188.	$ 185.51	$ 266.64	$ 200.05	$ 202.91	$ 191.21
Annual savings in carbon tax for natural gas [$/year]	$ 48.16	$ 48.97	$ 46.13	$ 49.14	$ 46.92	$ 46.3	$ 66.55	$ 49.93	$ 50.65	$ 47.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 241.09	$ 245.14	$ 230.95	$ 246.01	$ 234.92	$ 231.82	$ 333.19	$ 249.98	$ 253.56	$ 238.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	1070.1	1088.1	1025.1	1092	1042.7	1029	1478.9	1109.6	1125.5	1060.5
Net Present Value [$]	$ 270.7	$ 133.39	$ 222.57	$ 56.85	$ 229.23	$ 298.92	$ 4,095.08	$ 82.16	$ 37.32	$ 367.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 550.	$ 850.

MEDIUM Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,315.61	$ 9,409.8	$ 9,594.87	$ 9,630.54	$ 9,644.87	$ 9,815.61	$ 9,865.61	$ 9,909.8	$ 9,944.87	$ 9,959.8
ICC with multiplier (Van=1.0,this Cz =1)	$ 9,315.61	$ 9,409.8	$ 9,594.87	$ 9,630.54	$ 9,644.87	$ 9,815.61	$ 9,865.61	$ 9,909.8	$ 9,944.87	$ 9,959.8
Net Present Value [$]	$ 7,900.03	$ 7,946.02	$ 7,715.89	$ 8,092.63	$ 7,817.93	$ 7,862.14	$ 7,964.18	$ 7,938.44	$ 7,824.88	$ 8,039.92
Incremental dollars per GHG saving	$ 3.03	$ 3.06	$ 3.12	$ 3.13	$ 3.14	$ 3.19	$ 3.21	$ 3.22	$ 3.23	$ 3.24
Auxiliary Energy Required Heating [GJ/yr]	30.7	30.6	28.8	30.3	30.8	28.4	30.4	28.4	30.6	30.4
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.8	7.3	7.8	7.3	7.8	6.9	7.3
Annual Energy Space Heating [GJ/yr]	10.8	10.7	10	10.6	10.8	9.9	10.7	9.9	10.7	10.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	45.8	45.7	45.1	45.6	45.2	45	45.1	45	44.8	45
Design Heating Load [W]	6126.2	6134.3	5800.6	6080	6180.5	5746.3	6126.2	5754.5	6180.5	6134.3
Annual Energy Electricity [kWh/yr]	12708.9	12690.2	12528.9	12661.4	12549.1	12500	12520.2	12493	12435.3	12513
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,734.99	$ 1,732.35	$ 1,709.52	$ 1,728.27	$ 1,712.38	$ 1,705.44	$ 1,708.29	$ 1,704.44	$ 1,696.28	$ 1,707.27
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1906	3256	11356	3526	1637	11626	1907	12976	1638	3257
Upgrade Package List	Pkg1121102011	Pkg1131101011	Pkg2121101011	Pkg1131102011	Pkg1121101011	Pkg2121102011	Pkg1121102011	Pkg2131101011	Pkg1121101011	Pkg1131101011
GHGI [kg/m2]	0.6	0.6	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.59
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	36.4	36.3	34.1	35.9	36.5	33.7	36.1	33.6	36.3	36
Output: MEUI [kWh/(m2 * yr)]	23.8	23.7	23	23.6	23.1	22.9	23	22.9	22.6	23
Output: Better than ERS (%)	3970.0%	3990.0%	4070.0%	4000.0%	4050.0%	4080.0%	4070.0%	4080.0%	4110.0%	4080.0%
Output: Better than Envelope (%)	2480.0%	2440.0%	1710.0%	2320.0%	2520.0%	1540.0%	2360.0%	1540.0%	2440.0%	2360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4760	4741	4580	4712	4600	4551	4571	4544	4486	4564
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 671.12	$ 668.48	$ 645.74	$ 664.42	$ 648.59	$ 641.66	$ 644.51	$ 640.68	$ 632.54	$ 643.5
Annual savings in carbon tax for electricity [$/year]	$ 2.38	$ 2.37	$ 2.29	$ 2.36	$ 2.3	$ 2.28	$ 2.29	$ 2.27	$ 2.24	$ 2.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 673.5	$ 670.85	$ 648.03	$ 666.78	$ 650.89	$ 643.94	$ 646.8	$ 642.95	$ 634.78	$ 645.78
Annual savings in GHG from electricity savings [kg CO2e/year]	52.4	52.2	50.4	51.8	50.6	50.1	50.3	50	49.3	50.2
Annual savings in natural gas [m3/year]	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34
Annual savings in carbon tax for natural gas [$/year]	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6
Net Present Value [$]	$ 7,900.03	$ 7,946.02	$ 7,715.89	$ 8,092.63	$ 7,817.93	$ 7,862.14	$ 7,964.18	$ 7,938.44	$ 7,824.88	$ 8,039.92
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,909.63	$ 6,409.63	$ 7,130.37	$ 6,630.37	$ 7,224.56	$ 6,724.56	$ 5,670.87	$ 6,959.63	$ 7,445.3	$ 6,945.3
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,909.63	$ 6,409.63	$ 7,130.37	$ 6,630.37	$ 7,224.56	$ 6,724.56	$ 5,670.87	$ 6,959.63	$ 7,445.3	$ 6,945.3
Net Present Value [$]	$ 543.05	$ 524.85	$ 401.18	$ 383.71	$ 321.31	$ 303.84	$ 270.7	$ 216.4	$ 178.48	$ 161.97
Incremental dollars per GHG saving	$ 4.93	$ 4.97	$ 5.02	$ 5.07	$ 5.08	$ 5.13	$ 5.27	$ 5.17	$ 5.17	$ 5.23
Auxiliary Energy Required Heating [GJ/yr]	19.3	21.4	19	21.1	19	21.1	25.4	21.4	18.7	20.7
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	20.5	22.7	20.2	22.4	20.1	22.3	27	22.7	19.8	22
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	60.3	62.6	60	62.2	60	62.2	66.8	61.5	59.6	61.8
Design Heating Load [W]	5276.7	5651.7	5222.4	5597.3	5230.6	5605.5	5634.3	5651.7	5176.3	5551.2
Annual Energy Electricity [kWh/yr]	7427.5	7438.5	7425.8	7436.8	7425.5	7436.5	7459.7	7438.6	7423.8	7434.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 987.68	$ 989.23	$ 987.44	$ 988.99	$ 987.39	$ 988.95	$ 992.23	$ 989.25	$ 987.15	$ 988.71
Annual Energy Natural Gas [m3/yr]	902.5	961	893.6	952	892	950.4	1073	932.1	883.2	941.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 389.31	$ 414.54	$ 385.47	$ 410.66	$ 384.78	$ 409.97	$ 462.85	$ 402.08	$ 380.98	$ 406.13
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	1732	11722	2002	13072	3352	11344	1733	13342	3622
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg1121102031	Pkg2131101031	Pkg1131101031	Pkg2121101011	Pkg1121101031	Pkg2131102031	Pkg1131102031
GHGI [kg/m2]	7.72	8.2	7.65	8.13	7.63	8.11	9.11	7.96	7.56	8.04
% ICC	1.3%	1.2%	1.4%	1.3%	1.4%	1.3%	1.1%	1.3%	1.4%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	22.9	25.4	22.5	25	22.5	25	30.2	25.4	22.1	24.6
Output: MEUI [kWh/(m2 * yr)]	41.2	43.8	40.8	43.4	40.7	43.3	48.8	42.5	40.3	42.9
Output: Better than ERS (%)	2060.0%	1750.0%	2090.0%	1810.0%	2090.0%	1810.0%	1200.0%	1900.0%	2150.0%	1860.0%
Output: Better than Envelope (%)	2150.0%	1300.0%	2280.0%	1420.0%	2280.0%	1420.0%	330.0%	1300.0%	2400.0%	1590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	522	511	523	512	524	513	490	511	525	514
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 73.56	$ 72.01	$ 73.8	$ 72.25	$ 73.84	$ 72.29	$ 69.02	$ 71.99	$ 74.08	$ 72.53
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .24	$ .26	$ .26	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 73.82	$ 72.26	$ 74.06	$ 72.5	$ 74.1	$ 72.55	$ 69.26	$ 72.25	$ 74.34	$ 72.79
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.6	5.8	5.6	5.8	5.6	5.4	5.6	5.8	5.7
Annual savings in natural gas [m3/year]	27.18	25	27.51	25.33	27.57	25.39	20.82	26.07	27.9	25.72
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 251.79	$ 231.6	$ 254.86	$ 234.7	$ 255.42	$ 235.26	$ 192.93	$ 241.57	$ 258.45	$ 238.33
Annual savings in carbon tax for natural gas [$/year]	$ 62.85	$ 57.81	$ 63.61	$ 58.58	$ 63.75	$ 58.72	$ 48.16	$ 60.3	$ 64.51	$ 59.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 314.64	$ 289.4	$ 318.48	$ 293.29	$ 319.17	$ 293.98	$ 241.09	$ 301.87	$ 322.96	$ 297.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	1396.6	1284.6	1413.6	1301.8	1416.7	1304.9	1070.1	1339.9	1433.5	1321.9
Net Present Value [$]	$ 543.05	$ 524.85	$ 401.18	$ 383.71	$ 321.31	$ 303.84	$ 270.7	$ 216.4	$ 178.48	$ 161.97
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$.	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 7,459.63	$ 7,680.37	$ 7,759.63	$ 7,774.56	$ 7,904.37	$ 7,980.37	$ 7,995.3	$ 7,998.56	$ 8,074.56	$ 8,219.3
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,459.63	$ 7,680.37	$ 7,759.63	$ 7,774.56	$ 7,904.37	$ 7,980.37	$ 7,995.3	$ 7,998.56	$ 8,074.56	$ 8,219.3
Net Present Value [$]	$ 235.21	$ 93.34	$ 90.02	$ 13.23	$ 3,702.91	$ 51.61	$ 129.36	$ 3,781.98	$ 131.72	$ 3,923.06
Incremental dollars per GHG saving	$ 5.12	$ 5.21	$ 5.2	$ 5.26	$ 4.12	$ 5.28	$ 5.35	$ 4.16	$ 5.34	$ 4.23
Auxiliary Energy Required Heating [GJ/yr]	19.4	19	19.4	19	22.2	19	18.7	22.1	19	21.8
Annual Energy DHW [GJ/yr]	12.4	12.4	11.7	12.4	7.8	11.7	12.4	7.8	11.7	7.8
Annual Energy Space Heating [GJ/yr]	20.5	20.2	20.5	20.1	23.5	20.2	19.8	23.4	20.1	23.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	59.3	58.9	58.6	58.9	57.7	58.2	58.5	57.6	58.2	57.3
Design Heating Load [W]	5276.7	5222.4	5276.7	5230.6	5342.8	5222.4	5176.3	5350.9	5230.6	5296.6
Annual Energy Electricity [kWh/yr]	7427.5	7425.8	7427.5	7425.5	9612.8	7425.8	7423.8	9611.5	7425.5	9610.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 987.68	$ 987.44	$ 987.68	$ 987.39	$ 1,296.9	$ 987.44	$ 987.15	$ 1,296.71	$ 987.39	$ 1,296.51
Annual Energy Natural Gas [m3/yr]	873.6	864.7	855.1	863.1	619	846.2	854.3	617.6	844.6	608.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 376.84	$ 373.	$ 368.86	$ 372.31	$ 267.02	$ 365.02	$ 368.52	$ 266.41	$ 364.33	$ 262.49
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11453	11723	11454	13073	11725	11724	13343	13075	13074	13345
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2131101031	Pkg2131102031
GHGI [kg/m2]	7.48	7.41	7.33	7.4	5.51	7.26	7.33	5.5	7.25	5.42
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.9	22.6	22.9	22.5	26.3	22.6	22.1	26.2	22.5	25.8
Output: MEUI [kWh/(m2 * yr)]	39.9	39.5	39.1	39.4	38	38.7	39	37.9	38.6	37.5
Output: Better than ERS (%)	2190.0%	2240.0%	2280.0%	2240.0%	2390.0%	2330.0%	2290.0%	2400.0%	2330.0%	2440.0%
Output: Better than Envelope (%)	2110.0%	2280.0%	2110.0%	2280.0%	980.0%	2280.0%	2400.0%	1020.0%	2280.0%	1140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	522	523	522	524	1664	523	525	1662	524	1661
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 73.56	$ 73.8	$ 73.56	$ 73.84	$ 234.57	$ 73.8	$ 74.08	$ 234.38	$ 73.84	$ 234.19
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .83	$ .26	$ .26	$ .83	$ .26	$ .83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 73.82	$ 74.06	$ 73.82	$ 74.1	$ 235.4	$ 74.06	$ 74.34	$ 235.22	$ 74.1	$ 235.02
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.8	5.7	5.8	18.3	5.8	5.8	18.3	5.8	18.3
Annual savings in natural gas [m3/year]	28.25	28.59	28.94	28.64	37.74	29.27	28.97	37.79	29.33	38.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 261.77	$ 264.84	$ 268.15	$ 265.39	$ 349.66	$ 271.23	$ 268.43	$ 350.14	$ 271.78	$ 353.28
Annual savings in carbon tax for natural gas [$/year]	$ 65.34	$ 66.1	$ 66.93	$ 66.24	$ 87.27	$ 67.7	$ 67.	$ 87.39	$ 67.83	$ 88.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 327.1	$ 330.94	$ 335.08	$ 331.63	$ 436.93	$ 338.92	$ 335.43	$ 437.53	$ 339.61	$ 441.46
Annual savings in GHG from natural gas savings [kg CO2e/year]	1451.9	1469	1487.3	1472	1939.4	1504.4	1488.9	1942.1	1507.4	1959.5
Net Present Value [$]	$ 235.21	$ 93.34	$ 90.02	$ 13.23	$ 3,702.91	$ 51.61	$ 129.36	$ 3,781.98	$ 131.72	$ 3,923.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$.

MEDIUM Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,054.37	$ 11,148.56	$ 11,369.3	$ 11,383.63	$ 11,604.37	$ 11,683.63	$ 11,698.56	$ 11,904.37	$ 11,919.3	$ 11,998.56
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,054.37	$ 11,148.56	$ 11,369.3	$ 11,383.63	$ 11,604.37	$ 11,683.63	$ 11,698.56	$ 11,904.37	$ 11,919.3	$ 11,998.56
Net Present Value [$]	$ 7,792.68	$ 7,861.31	$ 8,019.78	$ 7,733.4	$ 7,891.33	$ 7,750.03	$ 7,966.53	$ 7,901.38	$ 8,118.43	$ 7,980.24
Incremental dollars per GHG saving	$ 3.59	$ 3.62	$ 3.69	$ 3.69	$ 3.77	$ 3.79	$ 3.8	$ 3.86	$ 3.87	$ 3.89
Auxiliary Energy Required Heating [GJ/yr]	22.1	22.1	21.7	22.2	21.9	22	21.8	21.7	21.5	21.7
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.3	6.9	7.3	6.9	7.3	6.9
Annual Energy Space Heating [GJ/yr]	7.8	7.8	7.7	7.8	7.7	7.8	7.7	7.7	7.6	7.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	43.2	43.1	43	42.6	42.5	42.2	42.5	42.1	42.4	42.1
Design Heating Load [W]	5388.7	5396.9	5342.5	5443	5388.7	5443	5396.9	5388.7	5342.5	5396.9
Annual Energy Electricity [kWh/yr]	11991.8	11981.9	11957.7	11840.9	11816.5	11730.8	11809.1	11703.9	11782.4	11697.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,633.52	$ 1,632.12	$ 1,628.7	$ 1,612.17	$ 1,608.72	$ 1,596.59	$ 1,607.67	$ 1,592.79	$ 1,603.89	$ 1,591.94
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11734	13084	13354	11465	11735	11466	13085	11736	13355	13086
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.55	0.55
% ICC	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.2	26.1	25.7	26.3	25.9	26.1	25.9	25.7	25.5	25.7
Output: MEUI [kWh/(m2 * yr)]	20.7	20.6	20.5	20	19.9	19.6	19.9	19.4	19.8	19.4
Output: Better than ERS (%)	4320.0%	4330.0%	4340.0%	4390.0%	4410.0%	4450.0%	4410.0%	4460.0%	4420.0%	4460.0%
Output: Better than Envelope (%)	1020.0%	1020.0%	1180.0%	980.0%	1100.0%	1060.0%	1140.0%	1180.0%	1260.0%	1180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4043	4033	4008	3892	3867	3782	3860	3755	3833	3749
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 570.01	$ 568.61	$ 565.2	$ 548.73	$ 545.29	$ 533.21	$ 544.25	$ 529.41	$ 540.48	$ 528.57
Annual savings in carbon tax for electricity [$/year]	$ 2.02	$ 2.02	$ 2.	$ 1.95	$ 1.93	$ 1.89	$ 1.93	$ 1.88	$ 1.92	$ 1.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 572.03	$ 570.63	$ 567.2	$ 550.68	$ 547.22	$ 535.1	$ 546.18	$ 531.29	$ 542.4	$ 530.44
Annual savings in GHG from electricity savings [kg CO2e/year]	44.5	44.4	44.1	42.8	42.5	41.6	42.5	41.3	42.2	41.2
Annual savings in natural gas [m3/year]	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34
Annual savings in carbon tax for natural gas [$/year]	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6
Net Present Value [$]	$ 7,792.68	$ 7,861.31	$ 8,019.78	$ 7,733.4	$ 7,891.33	$ 7,750.03	$ 7,966.53	$ 7,901.38	$ 8,118.43	$ 7,980.24
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.

MEDIUM Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,459.63	$ 7,680.37	$ 7,759.63	$ 7,774.56	$ 7,980.37	$ 7,995.3	$ 8,074.56	$ 8,295.3	$ 8,436.03	$ 8,656.77
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,459.63	$ 7,680.37	$ 7,759.63	$ 7,774.56	$ 7,980.37	$ 7,995.3	$ 8,074.56	$ 8,295.3	$ 8,436.03	$ 8,656.77
Net Present Value [$]	$ 235.21	$ 93.34	$ 90.02	$ 13.23	$ 51.61	$ 129.36	$ 131.72	$ 273.77	$ 366.31	$ 508.91
Incremental dollars per GHG saving	$ 5.12	$ 5.21	$ 5.2	$ 5.26	$ 5.28	$ 5.35	$ 5.34	$ 5.42	$ 5.49	$ 5.58
Auxiliary Energy Required Heating [GJ/yr]	19.4	19	19.4	19	19	18.7	19	18.7	16.9	16.5
Annual Energy DHW [GJ/yr]	12.4	12.4	11.7	12.4	11.7	12.4	11.7	11.7	13.5	13.5
Annual Energy Space Heating [GJ/yr]	20.5	20.2	20.5	20.1	20.2	19.8	20.1	19.8	17.9	17.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	59.3	58.9	58.6	58.9	58.2	58.5	58.2	57.8	57.7	57.4
Design Heating Load [W]	5276.7	5222.4	5276.7	5230.6	5222.4	5176.3	5230.6	5176.3	4965.3	4910.9
Annual Energy Electricity [kWh/yr]	7427.5	7425.8	7427.5	7425.5	7425.8	7423.8	7425.5	7423.9	7414.3	7412.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 987.68	$ 987.44	$ 987.68	$ 987.39	$ 987.44	$ 987.15	$ 987.39	$ 987.17	$ 985.81	$ 985.57
Annual Energy Natural Gas [m3/yr]	873.6	864.7	855.1	863.1	846.2	854.3	844.6	835.7	832.9	824.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 376.84	$ 373.	$ 368.86	$ 372.31	$ 365.02	$ 368.52	$ 364.33	$ 360.49	$ 359.28	$ 355.49
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11453	11723	11454	13073	11724	13343	13074	13344	17824	18094
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2131102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	7.48	7.41	7.33	7.4	7.26	7.33	7.25	7.17	7.15	7.08
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	22.9	22.6	22.9	22.5	22.6	22.1	22.5	22.1	20	19.6
Output: MEUI [kWh/(m2 * yr)]	39.9	39.5	39.1	39.4	38.7	39	38.6	38.2	38	37.6
Output: Better than ERS (%)	2190.0%	2240.0%	2280.0%	2240.0%	2330.0%	2290.0%	2330.0%	2380.0%	2400.0%	2440.0%
Output: Better than Envelope (%)	2110.0%	2280.0%	2110.0%	2280.0%	2280.0%	2400.0%	2280.0%	2400.0%	3130.0%	3290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	522	523	522	524	523	525	524	525	535	537
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 73.56	$ 73.8	$ 73.56	$ 73.84	$ 73.8	$ 74.08	$ 73.84	$ 74.07	$ 75.42	$ 75.66
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .27	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 73.82	$ 74.06	$ 73.82	$ 74.1	$ 74.06	$ 74.34	$ 74.1	$ 74.33	$ 75.69	$ 75.93
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.8	5.7	5.8	5.8	5.8	5.8	5.8	5.9	5.9
Annual savings in natural gas [m3/year]	28.25	28.59	28.94	28.64	29.27	28.97	29.33	29.67	29.77	30.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 261.77	$ 264.84	$ 268.15	$ 265.39	$ 271.23	$ 268.43	$ 271.78	$ 274.85	$ 275.82	$ 278.86
Annual savings in carbon tax for natural gas [$/year]	$ 65.34	$ 66.1	$ 66.93	$ 66.24	$ 67.7	$ 67.	$ 67.83	$ 68.6	$ 68.84	$ 69.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 327.1	$ 330.94	$ 335.08	$ 331.63	$ 338.92	$ 335.43	$ 339.61	$ 343.45	$ 344.66	$ 348.46
Annual savings in GHG from natural gas savings [kg CO2e/year]	1451.9	1469	1487.3	1472	1504.4	1488.9	1507.4	1524.5	1529.8	1546.7
Net Present Value [$]	$ 235.21	$ 93.34	$ 90.02	$ 13.23	$ 51.61	$ 129.36	$ 131.72	$ 273.77	$ 366.31	$ 508.91
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.

MEDIUM Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,902.74	$ 15,123.48	$ 15,217.67	$ 15,342.74	$ 15,363.62	$ 15,438.41	$ 15,452.74	$ 15,563.48	$ 15,584.36	$ 15,657.67
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,902.74	$ 15,123.48	$ 15,217.67	$ 15,342.74	$ 15,363.62	$ 15,438.41	$ 15,452.74	$ 15,563.48	$ 15,584.36	$ 15,657.67
Net Present Value [$]	$ 8,108.18	$ 8,269.22	$ 8,338.94	$ 8,295.85	$ 8,569.06	$ 8,498.15	$ 8,416.15	$ 8,466.93	$ 8,730.1	$ 8,535.56
Incremental dollars per GHG saving	$ 6.17	$ 6.26	$ 6.3	$ 6.35	$ 6.36	$ 6.39	$ 6.26	$ 6.44	$ 6.45	$ 6.48
Auxiliary Energy Required Heating [GJ/yr]	14.7	14.4	14.3	13.7	14.7	14	14.7	13.3	14.4	13.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	5.2	5.1	5.1	4.8	5.2	5	5.2	4.8	5.1	4.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.5	47.4	47.4	47.1	47.5	47.3	46.4	47.1	47.4	47
Design Heating Load [W]	4402.6	4348.2	4356.4	4295.8	4402.6	4302.1	4402.6	4241.5	4348.2	4249.7
Annual Energy Electricity [kWh/yr]	9441.4	9418.2	9408.7	9343.4	9441.4	9384.8	9442.1	9324.1	9418.2	9314.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,272.64	$ 1,269.36	$ 1,268.02	$ 1,258.78	$ 1,272.64	$ 1,264.63	$ 1,272.74	$ 1,256.05	$ 1,269.36	$ 1,254.64
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	333	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	35653	35869	37597	35671	36301	37813	35654	35887	36517	37615
Upgrade Package List	Pkg3221201032	Pkg3221202032	Pkg3231201032	Pkg3221201033	Pkg3221301032	Pkg3231202032	Pkg3221201032	Pkg3221202033	Pkg3221302032	Pkg3231201033
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.4	3.4	3.16	3.4	3.4	3.39
% ICC	2.9%	2.9%	2.9%	2.9%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.4	17	17	16.2	17.4	16.6	17.4	15.8	17	15.8
Output: MEUI [kWh/(m2 * yr)]	25.7	25.6	25.6	25.3	25.7	25.5	24.5	25.2	25.6	25.2
Output: Better than ERS (%)	3770.0%	3780.0%	3780.0%	3820.0%	3770.0%	3790.0%	3910.0%	3820.0%	3780.0%	3830.0%
Output: Better than Envelope (%)	4020.0%	4150.0%	4190.0%	4430.0%	4020.0%	4310.0%	4020.0%	4590.0%	4150.0%	4590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1492	1469	1460	1394	1492	1436	1493	1375	1469	1365
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 210.4	$ 207.13	$ 205.79	$ 196.58	$ 210.4	$ 202.42	$ 210.5	$ 193.86	$ 207.13	$ 192.46
Annual savings in carbon tax for electricity [$/year]	$ .75	$ .73	$ .73	$ .7	$ .75	$ .72	$ .75	$ .69	$ .73	$ .68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 211.15	$ 207.86	$ 206.52	$ 197.28	$ 211.15	$ 203.14	$ 211.25	$ 194.55	$ 207.86	$ 193.15
Annual savings in GHG from electricity savings [kg CO2e/year]	16.4	16.2	16.1	15.3	16.4	15.8	16.4	15.1	16.2	15
Annual savings in natural gas [m3/year]	47.31	47.31	47.31	47.31	47.31	47.31	48.4	47.31	47.31	47.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 438.34	$ 438.34	$ 438.34	$ 438.34	$ 438.34	$ 438.34	$ 448.39	$ 438.34	$ 438.34	$ 438.34
Annual savings in carbon tax for natural gas [$/year]	$ 109.41	$ 109.41	$ 109.41	$ 109.41	$ 109.41	$ 109.41	$ 111.91	$ 109.41	$ 109.41	$ 109.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 547.75	$ 547.75	$ 547.75	$ 547.75	$ 547.75	$ 547.75	$ 560.3	$ 547.75	$ 547.75	$ 547.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	2431.3	2431.3	2431.3	2431.3	2431.3	2431.3	2487	2431.3	2431.3	2431.3
Net Present Value [$]	$ 8,108.18	$ 8,269.22	$ 8,338.94	$ 8,295.85	$ 8,569.06	$ 8,498.15	$ 8,416.15	$ 8,466.93	$ 8,730.1	$ 8,535.56
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 17,134.34	$ 17,152.41	$ 17,230.01	$ 17,355.08	$ 17,387.48	$ 17,449.27	$ 17,465.08	$ 17,481.67	$ 17,474.23	$ 17,559.27
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,134.34	$ 17,152.41	$ 17,230.01	$ 17,355.08	$ 17,387.48	$ 17,449.27	$ 17,465.08	$ 17,481.67	$ 17,474.23	$ 17,559.27
Net Present Value [$]	$ 12,926.13	$ 12,994.23	$ 13,129.16	$ 13,074.93	$ 12,865.04	$ 13,147.76	$ 12,999.97	$ 12,947.91	$ 13,327.18	$ 13,083.39
Incremental dollars per GHG saving	$ 5.56	$ 5.56	$ 5.59	$ 5.63	$ 5.64	$ 5.66	$ 5.66	$ 5.67	$ 5.67	$ 5.69
Auxiliary Energy Required Heating [GJ/yr]	14.8	15.1	15.2	14.5	15.3	14.5	15.3	15.2	15.1	15.3
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.8	7.3	7.8	7.3	7.3	7.8	7.3
Annual Energy Space Heating [GJ/yr]	5.2	5.4	5.4	5.1	5.4	5.1	5.4	5.4	5.4	5.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	41.8	41.9	42	41.7	41.4	41.7	41.5	41.4	41.9	41.5
Design Heating Load [W]	4198.3	4289.1	4204.5	4144	4335.3	4152.1	4250.7	4343.4	4303.3	4258.9
Annual Energy Electricity [kWh/yr]	11624.2	11643.6	11665.9	11596.2	11502.1	11587.9	11524.4	11497.7	11647.9	11520.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,581.51	$ 1,584.25	$ 1,587.41	$ 1,577.55	$ 1,564.23	$ 1,576.37	$ 1,567.39	$ 1,563.61	$ 1,584.86	$ 1,566.79
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43450	37852	45592	43666	35909	45394	43649	37637	36124	45377
Upgrade Package List	Pkg3321201033	Pkg3321202034	Pkg3331202032	Pkg3321202033	Pkg3221202034	Pkg3331201033	Pkg3321202032	Pkg3231201034	Pkg3221203034	Pkg3331201032
GHGI [kg/m2]	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.55	0.54
% ICC	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.6	17.9	18	17.2	18.1	17.2	18.2	18.1	17.8	18.1
Output: MEUI [kWh/(m2 * yr)]	19.1	19.2	19.2	18.9	18.6	18.9	18.6	18.5	19.2	18.6
Output: Better than ERS (%)	4500.0%	4490.0%	4470.0%	4510.0%	4550.0%	4510.0%	4540.0%	4550.0%	4490.0%	4540.0%
Output: Better than Envelope (%)	3980.0%	3860.0%	3820.0%	4110.0%	3780.0%	4110.0%	3780.0%	3820.0%	3860.0%	3780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3675	3694	3717	3647	3553	3639	3575	3548	3699	3571
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 518.17	$ 520.91	$ 524.05	$ 514.23	$ 500.96	$ 513.06	$ 504.1	$ 500.34	$ 521.52	$ 503.51
Annual savings in carbon tax for electricity [$/year]	$ 1.84	$ 1.85	$ 1.86	$ 1.82	$ 1.78	$ 1.82	$ 1.79	$ 1.77	$ 1.85	$ 1.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 520.01	$ 522.76	$ 525.91	$ 516.05	$ 502.74	$ 514.88	$ 505.89	$ 502.11	$ 523.37	$ 505.3
Annual savings in GHG from electricity savings [kg CO2e/year]	40.4	40.6	40.9	40.1	39.1	40	39.3	39	40.7	39.3
Annual savings in natural gas [m3/year]	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34	$ 563.34
Annual savings in carbon tax for natural gas [$/year]	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61	$ 140.61
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94	$ 703.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6	3124.6
Net Present Value [$]	$ 12,926.13	$ 12,994.23	$ 13,129.16	$ 13,074.93	$ 12,865.04	$ 13,147.76	$ 12,999.97	$ 12,947.91	$ 13,327.18	$ 13,083.39
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	10.51	8.78	10.51	8.78	14.09	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	5.28	7.04	7.04	5.28	7.04	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 4,812.4	$ 4,812.4	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	DWHR eff 30	elec heatpump ef1.90	elec heatpump ef1.90	DWHR eff 30	elec heatpump ef1.90	DWHR eff 30
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.	$.	$ 550.

MEDIUM Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,902.74	$ 15,123.48	$ 15,342.74	$ 15,217.67	$ 15,452.74	$ 15,563.48	$ 15,438.41	$ 15,657.67	$ 15,752.74	$ 15,363.62
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,902.74	$ 15,123.48	$ 15,342.74	$ 15,217.67	$ 15,452.74	$ 15,563.48	$ 15,438.41	$ 15,657.67	$ 15,752.74	$ 15,363.62
Net Present Value [$]	$ 8,108.18	$ 8,269.22	$ 8,295.85	$ 8,338.94	$ 8,416.15	$ 8,466.93	$ 8,498.15	$ 8,535.56	$ 8,560.92	$ 8,569.06
Incremental dollars per GHG saving	$ 6.17	$ 6.26	$ 6.35	$ 6.3	$ 6.26	$ 6.44	$ 6.39	$ 6.48	$ 6.29	$ 6.36
Auxiliary Energy Required Heating [GJ/yr]	14.7	14.4	13.7	14.3	14.7	13.3	14	13.3	14.7	14.7
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5	11.7	13.5
Annual Energy Space Heating [GJ/yr]	5.2	5.1	4.8	5.1	5.2	4.8	5	4.7	5.2	5.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.5	47.4	47.1	47.4	46.4	47.1	47.3	47	45.7	47.5
Design Heating Load [W]	4402.6	4348.2	4295.8	4356.4	4402.6	4241.5	4302.1	4249.7	4402.6	4402.6
Annual Energy Electricity [kWh/yr]	9441.4	9418.2	9343.4	9408.7	9442.1	9324.1	9384.8	9314.2	9442.6	9441.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,272.64	$ 1,269.36	$ 1,258.78	$ 1,268.02	$ 1,272.74	$ 1,256.05	$ 1,264.63	$ 1,254.64	$ 1,272.81	$ 1,272.64
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	333	362.1	362.1	362.1	314.3	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 156.2	$ 156.2	$ 135.58	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	35653	35869	35671	37597	35654	35887	37813	37615	35655	36301
Upgrade Package List	Pkg3221201032	Pkg3221202032	Pkg3221201033	Pkg3231201032	Pkg3221201032	Pkg3221202033	Pkg3231202032	Pkg3231201033	Pkg3221201032	Pkg3221301032
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.16	3.4	3.4	3.39	3.01	3.4
% ICC	2.9%	2.9%	2.9%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%	2.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.4	17	16.2	17	17.4	15.8	16.6	15.8	17.4	17.4
Output: MEUI [kWh/(m2 * yr)]	25.7	25.6	25.3	25.6	24.5	25.2	25.5	25.2	23.6	25.7
Output: Better than ERS (%)	3770.0%	3780.0%	3820.0%	3780.0%	3910.0%	3820.0%	3790.0%	3830.0%	4000.0%	3770.0%
Output: Better than Envelope (%)	4020.0%	4150.0%	4430.0%	4190.0%	4020.0%	4590.0%	4310.0%	4590.0%	4020.0%	4020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1492	1469	1394	1460	1493	1375	1436	1365	1493	1492
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 210.4	$ 207.13	$ 196.58	$ 205.79	$ 210.5	$ 193.86	$ 202.42	$ 192.46	$ 210.57	$ 210.4
Annual savings in carbon tax for electricity [$/year]	$ .75	$ .73	$ .7	$ .73	$ .75	$ .69	$ .72	$ .68	$ .75	$ .75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 211.15	$ 207.86	$ 197.28	$ 206.52	$ 211.25	$ 194.55	$ 203.14	$ 193.15	$ 211.32	$ 211.15
Annual savings in GHG from electricity savings [kg CO2e/year]	16.4	16.2	15.3	16.1	16.4	15.1	15.8	15	16.4	16.4
Annual savings in natural gas [m3/year]	47.31	47.31	47.31	47.31	48.4	47.31	47.31	47.31	49.09	47.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 438.34	$ 438.34	$ 438.34	$ 438.34	$ 448.39	$ 438.34	$ 438.34	$ 438.34	$ 454.84	$ 438.34
Annual savings in carbon tax for natural gas [$/year]	$ 109.41	$ 109.41	$ 109.41	$ 109.41	$ 111.91	$ 109.41	$ 109.41	$ 109.41	$ 113.53	$ 109.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 547.75	$ 547.75	$ 547.75	$ 547.75	$ 560.3	$ 547.75	$ 547.75	$ 547.75	$ 568.37	$ 547.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	2431.3	2431.3	2431.3	2431.3	2487	2431.3	2431.3	2431.3	2522.8	2431.3
Net Present Value [$]	$ 8,108.18	$ 8,269.22	$ 8,295.85	$ 8,338.94	$ 8,416.15	$ 8,466.93	$ 8,498.15	$ 8,535.56	$ 8,560.92	$ 8,569.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$.

MEDIUM Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,391.34	$ 5,485.69	$ 5,670.73	$ 5,706.3	$ 5,809.5	$ 5,891.34	$ 5,941.34	$ 5,985.69	$ 6,030.11	$ 6,035.69
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 5,784.91	$ 5,886.15	$ 6,084.69	$ 6,122.86	$ 6,233.59	$ 6,321.41	$ 6,375.06	$ 6,422.65	$ 6,470.31	$ 6,476.3
Net Present Value [$]	$ 935.87	$ 858.2	$ 1,321.93	$ 734.12	$ 277.56	$ 1,198.04	$ 627.79	$ 1,120.43	$ 149.35	$ 550.18
Incremental dollars per GHG saving	$ 4.65	$ 4.72	$ 4.35	$ 4.82	$ 5.39	$ 4.45	$ 4.89	$ 4.51	$ 5.49	$ 4.96
Auxiliary Energy Required Heating [GJ/yr]	36.5	36.4	33.8	36	28.2	33.4	36.5	33.3	27.8	36.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	23.7	13.5	12.4	13.5	23.7	12.4
Annual Energy Space Heating [GJ/yr]	38.6	38.6	35.8	38.1	29.9	35.4	38.6	35.3	29.5	38.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	78.5	78.4	75.6	78	79.9	75.2	77.4	75.1	79.5	77.3
Design Heating Load [W]	7733.3	7747.8	7216.8	7678.4	7539.7	7147.5	7733.3	7161.9	7470.4	7747.8
Annual Energy Electricity [kWh/yr]	7518.1	7517.7	7503.9	7515.7	7474.3	7501.8	7518.1	7501.5	7472.3	7517.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,000.5	$ 1,000.44	$ 998.49	$ 1,000.16	$ 994.3	$ 998.19	$ 1,000.5	$ 998.15	$ 994.02	$ 1,000.45
Annual Energy Natural Gas [m3/yr]	1380.6	1378.7	1305.5	1367.8	1422.7	1294.6	1351.7	1292.7	1412.3	1349.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 595.54	$ 594.72	$ 563.15	$ 590.02	$ 613.7	$ 558.45	$ 583.08	$ 557.63	$ 609.22	$ 582.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1894	3244	11344	3514	1729	11614	1895	12964	1999	3245
Upgrade Package List	Pkg1121102011	Pkg1131101011	Pkg2121101011	Pkg1131102011	Pkg1121101031	Pkg2121102011	Pkg1121102011	Pkg2131101011	Pkg1121102031	Pkg1131101011
GHGI [kg/m2]	11.63	11.61	11.02	11.53	11.97	10.93	11.39	10.91	11.89	11.38
% ICC	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	43.2	43.1	40	42.7	33.4	39.6	43.2	39.5	33	43.1
Output: MEUI [kWh/(m2 * yr)]	62.6	62.6	59.3	62.1	64.3	58.8	61.4	58.7	63.8	61.3
Output: Better than ERS (%)	970.0%	980.0%	1300.0%	1020.0%	1390.0%	1350.0%	1090.0%	1360.0%	1430.0%	1100.0%
Output: Better than Envelope (%)	1300.0%	1270.0%	460.0%	1150.0%	1270.0%	340.0%	1300.0%	310.0%	1390.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	498	498	512	500	542	514	498	515	544	498
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 70.22	$ 70.27	$ 72.22	$ 70.56	$ 76.39	$ 72.52	$ 70.22	$ 72.56	$ 76.68	$ 70.26
Annual savings in carbon tax for electricity [$/year]	$ .25	$ .25	$ .26	$ .25	$ .27	$ .26	$ .25	$ .26	$ .27	$ .25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 70.47	$ 70.52	$ 72.48	$ 70.81	$ 76.66	$ 72.77	$ 70.47	$ 72.82	$ 76.95	$ 70.51
Annual savings in GHG from electricity savings [kg CO2e/year]	5.5	5.5	5.6	5.5	6	5.7	5.5	5.7	6	5.5
Annual savings in natural gas [m3/year]	22.44	22.51	25.24	22.92	20.87	25.65	23.52	25.72	21.26	23.59
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 207.92	$ 208.57	$ 233.84	$ 212.33	$ 193.38	$ 237.6	$ 217.89	$ 238.26	$ 196.97	$ 218.55
Annual savings in carbon tax for natural gas [$/year]	$ 51.89	$ 52.06	$ 58.37	$ 53.	$ 48.27	$ 59.3	$ 54.38	$ 59.47	$ 49.16	$ 54.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 259.81	$ 260.63	$ 292.21	$ 265.33	$ 241.65	$ 296.91	$ 272.28	$ 297.73	$ 246.14	$ 273.1
Annual savings in GHG from natural gas savings [kg CO2e/year]	1153.2	1156.9	1297	1177.7	1072.6	1317.9	1208.6	1321.5	1092.5	1212.2
Net Present Value [$]	$ 935.87	$ 858.2	$ 1,321.93	$ 734.12	$ 277.56	$ 1,198.04	$ 627.79	$ 1,120.43	$ 149.35	$ 550.18
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	NA	NA	NA	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$.	$.	$.	$.	$ 1,238.77	$.	$.	$.	$ 1,238.77	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 229.26	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 544.22
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

MEDIUM Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 55
Total increase in construction cost [$]	$ 10,130.3	$ 10,333.5	$ 10,365.34	$ 8,541.34	$ 10,459.69	$ 10,453.38	$ 8,635.69	$ 10,554.11	$ 10,648.46	$ 10,665.34
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 10,869.81	$ 11,087.85	$ 11,122.01	$ 9,164.86	$ 11,223.25	$ 11,216.48	$ 9,266.1	$ 11,324.56	$ 11,425.8	$ 11,443.91
Net Present Value [$]	$ 9,674.11	$ 9,700.39	$ 9,566.62	$ 5,501.49	$ 9,643.26	$ 10,079.17	$ 5,578.67	$ 9,821.85	$ 9,832.21	$ 9,570.29
Incremental dollars per GHG saving	$ 2.72	$ 2.77	$ 2.78	$ 2.79	$ 2.81	$ 2.81	$ 2.82	$ 2.83	$ 2.86	$ 2.86
Auxiliary Energy Required Heating [GJ/yr]	36.5	33.1	36.7	36.4	36.6	35.6	36.3	32.8	32.7	36.5
Annual Energy DHW [GJ/yr]	7.8	7.8	7.3	13.5	7.3	7.8	13.5	7.8	7.8	6.9
Annual Energy Space Heating [GJ/yr]	14.8	13.7	14.9	14.7	14.8	14.7	14.7	13.6	13.4	14.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	51.4	51.2	51	57.1	50.9	51.6	57.1	51.1	50.9	50.6
Design Heating Load [W]	7341.7	7601.8	7396.6	7794.9	7411	7601.8	7809.3	7532.5	7546.9	7396.6
Annual Energy Electricity [kWh/yr]	14290.4	14221.7	14157.4	12108.8	14150.5	14322.3	12102.1	14183.2	14150.6	14042.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,958.78	$ 1,949.06	$ 1,939.96	$ 1,650.08	$ 1,938.98	$ 1,963.29	$ 1,649.13	$ 1,943.61	$ 1,938.99	$ 1,923.67
Annual Energy Natural Gas [m3/yr]	0	0	0	362.1	0	0	362.1	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 156.2	$.	$.	$ 156.2	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13246	1744	11627	1903	12977	1690	3253	2014	3364	11628
Upgrade Package List	Pkg2131102011	Pkg1121101031	Pkg2121102011	Pkg1121102011	Pkg2131101011	Pkg1121101021	Pkg1131101011	Pkg1121102031	Pkg1131101031	Pkg2121102011
GHGI [kg/m2]	0.67	0.67	0.66	3.53	0.66	0.67	3.53	0.67	0.66	0.66
% ICC	1.9%	2.0%	2.0%	1.6%	2.0%	2.0%	1.7%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.2	39.3	43.4	43.1	43.4	42.1	43	38.8	38.8	43.2
Output: MEUI [kWh/(m2 * yr)]	30.2	29.7	29.6	36.9	29.6	30.3	36.8	29.5	29.4	29.1
Output: Better than ERS (%)	4210.0%	4230.0%	4260.0%	3560.0%	4270.0%	4190.0%	3560.0%	4250.0%	4270.0%	4300.0%
Output: Better than Envelope (%)	1300.0%	250.0%	1360.0%	1270.0%	1330.0%	1020.0%	1240.0%	150.0%	120.0%	1300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6274	6206	6141	4093	6134	6306	4086	6167	6134	6026
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 884.68	$ 874.99	$ 865.92	$ 577.07	$ 864.95	$ 889.17	$ 576.13	$ 869.56	$ 864.96	$ 849.69
Annual savings in carbon tax for electricity [$/year]	$ 3.14	$ 3.1	$ 3.07	$ 2.05	$ 3.07	$ 3.15	$ 2.04	$ 3.08	$ 3.07	$ 3.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 887.81	$ 878.09	$ 868.99	$ 579.12	$ 868.02	$ 892.33	$ 578.17	$ 872.64	$ 868.03	$ 852.71
Annual savings in GHG from electricity savings [kg CO2e/year]	69	68.3	67.6	45	67.5	69.4	44.9	67.8	67.5	66.3
Annual savings in natural gas [m3/year]	73.88	73.88	73.88	60.39	73.88	73.88	60.39	73.88	73.88	73.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 684.5	$ 684.5	$ 684.5	$ 559.51	$ 684.5	$ 684.5	$ 559.51	$ 684.5	$ 684.5	$ 684.5
Annual savings in carbon tax for natural gas [$/year]	$ 170.85	$ 170.85	$ 170.85	$ 139.65	$ 170.85	$ 170.85	$ 139.65	$ 170.85	$ 170.85	$ 170.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 855.35	$ 855.35	$ 855.35	$ 699.16	$ 855.35	$ 855.35	$ 699.16	$ 855.35	$ 855.35	$ 855.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	3796.6	3796.6	3796.6	3103.3	3796.6	3796.6	3103.3	3796.6	3796.6	3796.6
Net Present Value [$]	$ 9,674.11	$ 9,700.39	$ 9,566.62	$ 5,501.49	$ 9,643.26	$ 10,079.17	$ 5,578.67	$ 9,821.85	$ 9,832.21	$ 9,570.29
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	USI1 40 SHGC0 35	NA	NA	NA	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$.	$ 1,238.77	$.	$.	$.	$ 1,358.65	$.	$ 1,238.77	$ 1,238.77	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.22	$ 229.26	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$.	$.	$.	$.	$ 850.

MEDIUM Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,909.5	$ 7,130.11	$ 7,224.46	$ 6,409.5	$ 6,630.11	$ 6,724.46	$ 5,670.73	$ 6,959.5	$ 6,945.07	$ 5,891.34
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,413.89	$ 7,650.61	$ 7,751.85	$ 6,877.39	$ 7,114.11	$ 7,215.35	$ 6,084.69	$ 7,467.54	$ 7,452.06	$ 6,321.41
Net Present Value [$]	$ 1,786.79	$ 1,660.82	$ 1,580.	$ 1,554.83	$ 1,428.87	$ 1,347.08	$ 1,321.93	$ 1,246.57	$ 1,221.36	$ 1,198.04
Incremental dollars per GHG saving	$ 4.14	$ 4.22	$ 4.26	$ 4.24	$ 4.32	$ 4.38	$ 4.35	$ 4.44	$ 4.46	$ 4.45
Auxiliary Energy Required Heating [GJ/yr]	26.9	26.5	26.5	29.9	29.5	29.4	33.8	29.9	29	33.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	28.5	28.1	28	31.6	31.2	31.2	35.8	31.6	30.8	35.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	68.3	67.9	67.9	71.5	71.1	71	75.6	70.4	70.6	75.2
Design Heating Load [W]	6760.6	6691.2	6705.7	7346.4	7277.1	7291.5	7216.8	7346.4	7222.2	7147.5
Annual Energy Electricity [kWh/yr]	7467.5	7465.5	7465.2	7483.1	7481.1	7480.8	7503.9	7483.2	7478.8	7501.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.34	$ 993.05	$ 993.01	$ 995.54	$ 995.26	$ 995.22	$ 998.49	$ 995.56	$ 994.94	$ 998.19
Annual Energy Natural Gas [m3/yr]	1113.3	1102.6	1101.1	1195.9	1185.2	1183.8	1305.5	1167	1173.1	1294.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 480.24	$ 475.62	$ 474.98	$ 515.87	$ 511.25	$ 510.65	$ 563.15	$ 503.4	$ 506.03	$ 558.45
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	1732	2002	3352	11344	1733	3622	11614
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg2121101011	Pkg1121101031	Pkg1131102031	Pkg2121102011
GHGI [kg/m2]	9.44	9.36	9.34	10.12	10.03	10.02	11.02	9.88	9.93	10.93
% ICC	1.3%	1.4%	1.4%	1.2%	1.3%	1.3%	1.1%	1.3%	1.3%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.9	31.4	31.4	35.4	34.9	34.9	40	35.4	34.4	39.6
Output: MEUI [kWh/(m2 * yr)]	50.6	50.1	50.1	54.3	53.9	53.8	59.3	53.1	53.3	58.8
Output: Better than ERS (%)	2140.0%	2190.0%	2190.0%	1770.0%	1820.0%	1830.0%	1300.0%	1900.0%	1880.0%	1350.0%
Output: Better than Envelope (%)	1670.0%	1800.0%	1800.0%	740.0%	870.0%	900.0%	460.0%	740.0%	1020.0%	340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	549	551	551	533	535	535	512	533	537	514
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 77.35	$ 77.63	$ 77.68	$ 75.15	$ 75.43	$ 75.48	$ 72.22	$ 75.14	$ 75.76	$ 72.52
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .28	$ .28	$ .27	$ .27	$ .27	$ .26	$ .27	$ .27	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 77.63	$ 77.91	$ 77.95	$ 75.42	$ 75.7	$ 75.74	$ 72.48	$ 75.41	$ 76.03	$ 72.77
Annual savings in GHG from electricity savings [kg CO2e/year]	6	6.1	6.1	5.9	5.9	5.9	5.6	5.9	5.9	5.7
Annual savings in natural gas [m3/year]	32.4	32.8	32.85	29.32	29.72	29.77	25.24	30.4	30.17	25.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 300.19	$ 303.88	$ 304.4	$ 271.68	$ 275.37	$ 275.85	$ 233.84	$ 281.65	$ 279.55	$ 237.6
Annual savings in carbon tax for natural gas [$/year]	$ 74.93	$ 75.85	$ 75.98	$ 67.81	$ 68.73	$ 68.85	$ 58.37	$ 70.3	$ 69.77	$ 59.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 375.12	$ 379.73	$ 380.38	$ 339.48	$ 344.1	$ 344.7	$ 292.21	$ 351.95	$ 349.32	$ 296.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	1665	1685.5	1688.4	1506.9	1527.4	1530	1297	1562.2	1550.5	1317.9
Net Present Value [$]	$ 1,786.79	$ 1,660.82	$ 1,580.	$ 1,554.83	$ 1,428.87	$ 1,347.08	$ 1,321.93	$ 1,246.57	$ 1,221.36	$ 1,198.04
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$.	$ 1,238.77	$ 1,238.77	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 229.26	$ 544.22	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,445.07	$ 7,459.5	$ 7,680.11	$ 7,759.5	$ 7,774.46	$ 7,980.11	$ 7,995.07	$ 8,074.46	$ 8,295.07	$ 8,435.9
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,988.56	$ 8,004.04	$ 8,240.76	$ 8,325.94	$ 8,342.	$ 8,562.66	$ 8,578.71	$ 8,663.9	$ 8,900.61	$ 9,051.72
Net Present Value [$]	$ 1,453.32	$ 1,479.67	$ 1,352.98	$ 1,334.54	$ 1,272.17	$ 1,208.76	$ 1,145.48	$ 1,127.58	$ 1,000.89	$ 1,011.87
Incremental dollars per GHG saving	$ 4.34	$ 4.32	$ 4.4	$ 4.4	$ 4.44	$ 4.48	$ 4.52	$ 4.52	$ 4.59	$ 4.6
Auxiliary Energy Required Heating [GJ/yr]	26.1	26.9	26.5	26.9	26.5	26.5	26.1	26.5	26.1	23.9
Annual Energy DHW [GJ/yr]	13.5	12.4	12.4	11.7	12.4	11.7	12.4	11.7	11.7	13.5
Annual Energy Space Heating [GJ/yr]	27.6	28.5	28.1	28.5	28	28.1	27.6	28	27.6	25.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.5	67.3	66.9	66.6	66.8	66.2	66.4	66.1	65.7	65.1
Design Heating Load [W]	6636.4	6760.6	6691.2	6760.6	6705.7	6691.2	6636.4	6705.7	6636.4	6363.1
Annual Energy Electricity [kWh/yr]	7463.2	7467.5	7465.5	7467.6	7465.2	7465.5	7463.2	7465.3	7463.3	7451.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 992.73	$ 993.34	$ 993.05	$ 993.35	$ 993.01	$ 993.05	$ 992.73	$ 993.02	$ 992.74	$ 991.07
Annual Energy Natural Gas [m3/yr]	1090.5	1084.3	1073.7	1065.8	1072.2	1055.1	1061.6	1053.6	1043	1028.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 470.4	$ 467.73	$ 463.16	$ 459.75	$ 462.51	$ 455.13	$ 457.94	$ 454.49	$ 449.91	$ 443.66
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	13342	11453	11723	11454	13073	11724	13343	13074	13344	17824
Upgrade Package List	Pkg2131102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2131102031	Pkg2221101031
GHGI [kg/m2]	9.26	9.21	9.12	9.06	9.11	8.97	9.02	8.96	8.87	8.75
% ICC	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	30.9	31.9	31.4	31.9	31.4	31.4	30.9	31.4	30.9	28.3
Output: MEUI [kWh/(m2 * yr)]	49.6	49.3	48.9	48.5	48.8	48	48.3	48	47.5	46.8
Output: Better than ERS (%)	2230.0%	2260.0%	2300.0%	2340.0%	2310.0%	2380.0%	2360.0%	2390.0%	2440.0%	2510.0%
Output: Better than Envelope (%)	1920.0%	1670.0%	1800.0%	1670.0%	1800.0%	1800.0%	1920.0%	1800.0%	1920.0%	2600.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	553	549	551	548	551	551	553	551	553	565
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 77.96	$ 77.35	$ 77.63	$ 77.34	$ 77.68	$ 77.63	$ 77.96	$ 77.66	$ 77.94	$ 79.61
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .27	$ .28	$ .27	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 78.24	$ 77.63	$ 77.91	$ 77.61	$ 77.95	$ 77.91	$ 78.24	$ 77.94	$ 78.22	$ 79.89
Annual savings in GHG from electricity savings [kg CO2e/year]	6.1	6	6.1	6	6.1	6.1	6.1	6.1	6.1	6.2
Annual savings in natural gas [m3/year]	33.25	33.48	33.88	34.17	33.93	34.57	34.33	34.62	35.02	35.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 308.06	$ 310.2	$ 313.86	$ 316.59	$ 314.38	$ 320.28	$ 318.04	$ 320.8	$ 324.46	$ 329.46
Annual savings in carbon tax for natural gas [$/year]	$ 76.89	$ 77.42	$ 78.34	$ 79.02	$ 78.47	$ 79.94	$ 79.38	$ 80.07	$ 80.98	$ 82.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 384.95	$ 387.62	$ 392.2	$ 395.6	$ 392.84	$ 400.22	$ 397.42	$ 400.87	$ 405.44	$ 411.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	1708.7	1720.5	1740.8	1756	1743.7	1776.5	1764	1779.3	1799.6	1827.4
Net Present Value [$]	$ 1,453.32	$ 1,479.67	$ 1,352.98	$ 1,334.54	$ 1,272.17	$ 1,208.76	$ 1,145.48	$ 1,127.58	$ 1,000.89	$ 1,011.87
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.22	$ 229.26	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 544.22	$ 544.22	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$.

MEDIUM Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 10,059.5	$ 12,359.9	$ 10,280.11	$ 12,580.51	$ 10,374.46	$ 12,633.5	$ 12,674.86	$ 10,609.5	$ 12,729.07	$ 12,854.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 10,793.84	$ 13,262.17	$ 11,030.56	$ 13,498.89	$ 11,131.8	$ 13,555.75	$ 13,600.12	$ 11,383.99	$ 13,658.29	$ 13,792.46
Net Present Value [$]	$ 4,891.62	$ 9,925.95	$ 5,145.46	$ 10,059.1	$ 5,226.85	$ 11,276.98	$ 10,128.99	$ 5,199.04	$ 11,548.38	$ 11,407.03
Incremental dollars per GHG saving	$ 3.28	$ 3.31	$ 3.35	$ 3.37	$ 3.38	$ 3.39	$ 3.39	$ 3.4	$ 3.41	$ 3.44
Auxiliary Energy Required Heating [GJ/yr]	26.8	27.1	26.5	26.7	26.4	27.5	26.7	26.8	28	27.1
Annual Energy DHW [GJ/yr]	13.5	7.8	13.5	7.8	13.5	7.8	7.8	12.4	7.8	7.8
Annual Energy Space Heating [GJ/yr]	10.8	11.1	10.9	10.9	10.9	11.5	10.9	10.8	11.8	11.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	1.7	0.7	0.7	1.7	1.7
Total Energy [GJ/yr]	54.1	48.7	54.1	48.6	54.1	50.2	48.5	53	50.4	50.1
Design Heating Load [W]	6819.2	6612.3	6749.9	6542.9	6764.3	6338.6	6557.4	6819.2	6350.6	6269.3
Annual Energy Electricity [kWh/yr]	11282.2	13522.2	11295.1	13488.2	11290.1	13940.7	13478.7	11283	14009	13905.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,533.12	$ 1,850.08	$ 1,534.94	$ 1,845.27	$ 1,534.23	$ 1,909.29	$ 1,843.92	$ 1,533.23	$ 1,918.96	$ 1,904.31
Annual Energy Natural Gas [m3/yr]	362.1	0	362.1	0	362.1	0	0	332.9	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$.	$ 156.2	$.	$ 156.2	$.	$.	$ 143.6	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11461	17836	11731	18106	13081	11500	20968	11462	13372	11770
Upgrade Package List	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2221102031	Pkg2131101031	Pkg2121101033	Pkg2231101031	Pkg2121101031	Pkg2131102032	Pkg2121102033
GHGI [kg/m2]	3.49	0.63	3.49	0.63	3.49	0.65	0.63	3.25	0.66	0.65
% ICC	1.9%	2.4%	2.0%	2.4%	2.0%	2.4%	2.4%	2.0%	2.4%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.8	32.1	31.4	31.6	31.3	32.6	31.6	31.8	33.2	32.2
Output: MEUI [kWh/(m2 * yr)]	33.1	26.7	33.2	26.6	33.2	28.5	26.5	31.9	28.8	28.3
Output: Better than ERS (%)	3890.0%	4520.0%	3890.0%	4530.0%	3890.0%	4350.0%	4540.0%	4020.0%	4320.0%	4360.0%
Output: Better than Envelope (%)	1700.0%	1610.0%	1800.0%	1730.0%	1830.0%	1490.0%	1730.0%	1700.0%	1330.0%	1610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3266	5506	3279	5472	3274	5925	5463	3267	5993	5889
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 460.52	$ 776.36	$ 462.34	$ 771.57	$ 461.63	$ 835.37	$ 770.23	$ 460.63	$ 845.	$ 830.41
Annual savings in carbon tax for electricity [$/year]	$ 1.63	$ 2.75	$ 1.64	$ 2.74	$ 1.64	$ 2.96	$ 2.73	$ 1.63	$ 3.	$ 2.94
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 462.15	$ 779.11	$ 463.98	$ 774.3	$ 463.27	$ 838.33	$ 772.96	$ 462.27	$ 848.	$ 833.35
Annual savings in GHG from electricity savings [kg CO2e/year]	35.9	60.6	36.1	60.2	36	65.2	60.1	35.9	65.9	64.8
Annual savings in natural gas [m3/year]	60.39	73.88	60.39	73.88	60.39	73.88	73.88	61.48	73.88	73.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 559.51	$ 684.5	$ 559.51	$ 684.5	$ 559.51	$ 684.5	$ 684.5	$ 569.59	$ 684.5	$ 684.5
Annual savings in carbon tax for natural gas [$/year]	$ 139.65	$ 170.85	$ 139.65	$ 170.85	$ 139.65	$ 170.85	$ 170.85	$ 142.17	$ 170.85	$ 170.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 699.16	$ 855.35	$ 699.16	$ 855.35	$ 699.16	$ 855.35	$ 855.35	$ 711.75	$ 855.35	$ 855.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	3103.3	3796.6	3103.3	3796.6	3103.3	3796.6	3796.6	3159.2	3796.6	3796.6
Net Present Value [$]	$ 4,891.62	$ 9,925.95	$ 5,145.46	$ 10,059.1	$ 5,226.85	$ 11,276.98	$ 10,128.99	$ 5,199.04	$ 11,548.38	$ 11,407.03
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	5.28	3.87	5.28	3.87	3.87	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 4,812.4	$ 3,286.	$ 4,812.4	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 229.26	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 75	NA	NA	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,800.	$.	$.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 7,459.5	$ 7,445.07	$ 7,680.11	$ 7,759.5	$ 7,774.46	$ 7,980.11	$ 7,995.07	$ 8,074.46	$ 8,435.9	$ 8,295.07
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 8,004.04	$ 7,988.56	$ 8,240.76	$ 8,325.94	$ 8,342.	$ 8,562.66	$ 8,578.71	$ 8,663.9	$ 9,051.72	$ 8,900.61
Net Present Value [$]	$ 1,479.67	$ 1,453.32	$ 1,352.98	$ 1,334.54	$ 1,272.17	$ 1,208.76	$ 1,145.48	$ 1,127.58	$ 1,011.87	$ 1,000.89
Incremental dollars per GHG saving	$ 4.32	$ 4.34	$ 4.4	$ 4.4	$ 4.44	$ 4.48	$ 4.52	$ 4.52	$ 4.6	$ 4.59
Auxiliary Energy Required Heating [GJ/yr]	26.9	26.1	26.5	26.9	26.5	26.5	26.1	26.5	23.9	26.1
Annual Energy DHW [GJ/yr]	12.4	13.5	12.4	11.7	12.4	11.7	12.4	11.7	13.5	11.7
Annual Energy Space Heating [GJ/yr]	28.5	27.6	28.1	28.5	28	28.1	27.6	28	25.3	27.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.3	67.5	66.9	66.6	66.8	66.2	66.4	66.1	65.1	65.7
Design Heating Load [W]	6760.6	6636.4	6691.2	6760.6	6705.7	6691.2	6636.4	6705.7	6363.1	6636.4
Annual Energy Electricity [kWh/yr]	7467.5	7463.2	7465.5	7467.6	7465.2	7465.5	7463.2	7465.3	7451.5	7463.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.34	$ 992.73	$ 993.05	$ 993.35	$ 993.01	$ 993.05	$ 992.73	$ 993.02	$ 991.07	$ 992.74
Annual Energy Natural Gas [m3/yr]	1084.3	1090.5	1073.7	1065.8	1072.2	1055.1	1061.6	1053.6	1028.5	1043
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 467.73	$ 470.4	$ 463.16	$ 459.75	$ 462.51	$ 455.13	$ 457.94	$ 454.49	$ 443.66	$ 449.91
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11453	13342	11723	11454	13073	11724	13343	13074	17824	13344
Upgrade Package List	Pkg2121101031	Pkg2133102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2122102031	Pkg2133102031	Pkg2133101031	Pkg2221101031	Pkg2133102031
GHGI [kg/m2]	9.21	9.26	9.12	9.06	9.11	8.97	9.02	8.96	8.75	8.87
% ICC	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.9	30.9	31.4	31.9	31.4	31.4	30.9	31.4	28.3	30.9
Output: MEUI [kWh/(m2 * yr)]	49.3	49.6	48.9	48.5	48.8	48	48.3	48	46.8	47.5
Output: Better than ERS (%)	2260.0%	2230.0%	2300.0%	2340.0%	2310.0%	2380.0%	2360.0%	2390.0%	2510.0%	2440.0%
Output: Better than Envelope (%)	1670.0%	1920.0%	1800.0%	1670.0%	1800.0%	1800.0%	1920.0%	1800.0%	2600.0%	1920.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	549	553	551	548	551	551	553	551	565	553
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 77.35	$ 77.96	$ 77.63	$ 77.34	$ 77.68	$ 77.63	$ 77.96	$ 77.66	$ 79.61	$ 77.94
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .28	$ .28	$ .27	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 77.63	$ 78.24	$ 77.91	$ 77.61	$ 77.95	$ 77.91	$ 78.24	$ 77.94	$ 79.89	$ 78.22
Annual savings in GHG from electricity savings [kg CO2e/year]	6	6.1	6.1	6	6.1	6.1	6.1	6.1	6.2	6.1
Annual savings in natural gas [m3/year]	33.48	33.25	33.88	34.17	33.93	34.57	34.33	34.62	35.56	35.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 310.2	$ 308.06	$ 313.86	$ 316.59	$ 314.38	$ 320.28	$ 318.04	$ 320.8	$ 329.46	$ 324.46
Annual savings in carbon tax for natural gas [$/year]	$ 77.42	$ 76.89	$ 78.34	$ 79.02	$ 78.47	$ 79.94	$ 79.38	$ 80.07	$ 82.23	$ 80.98
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 387.62	$ 384.95	$ 392.2	$ 395.6	$ 392.84	$ 400.22	$ 397.42	$ 400.87	$ 411.69	$ 405.44
Annual savings in GHG from natural gas savings [kg CO2e/year]	1720.5	1708.7	1740.8	1756	1743.7	1776.5	1764	1779.3	1827.4	1799.6
Net Present Value [$]	$ 1,479.67	$ 1,453.32	$ 1,352.98	$ 1,334.54	$ 1,272.17	$ 1,208.76	$ 1,145.48	$ 1,127.58	$ 1,011.87	$ 1,000.89
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 544.22	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 544.22	$ 544.22	$ 229.26	$ 544.22
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.

MEDIUM Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,360.8	$ 16,378.77	$ 16,456.37	$ 16,581.41	$ 16,675.76	$ 16,700.2	$ 16,777.8	$ 16,821.86	$ 16,839.83	$ 16,860.8
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,555.14	$ 17,574.42	$ 17,657.69	$ 17,791.85	$ 17,893.09	$ 17,919.31	$ 18,002.58	$ 18,049.86	$ 18,069.14	$ 18,091.64
Net Present Value [$]	$ 9,441.01	$ 9,621.12	$ 9,681.01	$ 9,575.81	$ 9,650.99	$ 9,919.91	$ 9,991.12	$ 9,902.07	$ 10,082.18	$ 9,737.62
Incremental dollars per GHG saving	$ 5.32	$ 5.33	$ 5.35	$ 5.39	$ 5.42	$ 5.43	$ 5.46	$ 5.47	$ 5.48	$ 5.48
Auxiliary Energy Required Heating [GJ/yr]	17.8	18.2	18.3	17.5	17.4	18.1	18.2	17.8	18.2	17
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	7.3	7.6	7.6	7.2	7.2	7.5	7.6	7.3	7.6	7.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	51.6	51.9	51.9	51.5	51.5	51.8	51.8	51.6	51.9	51.4
Design Heating Load [W]	5183.8	5303.7	5195.8	5114.5	5128.9	5317.8	5209.9	5183.8	5303.7	5154.6
Annual Energy Electricity [kWh/yr]	10601.7	10664.7	10657.8	10568.4	10560.9	10655.9	10653.4	10601.7	10664.7	10522.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,436.83	$ 1,445.74	$ 1,444.76	$ 1,432.11	$ 1,431.05	$ 1,444.49	$ 1,444.14	$ 1,436.83	$ 1,445.74	$ 1,425.65
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43447	37849	45589	43663	45391	36121	43861	44095	38497	43465
Upgrade Package List	Pkg3321201033	Pkg3231202034	Pkg3331202032	Pkg3321202033	Pkg3331201033	Pkg3221203034	Pkg3321203032	Pkg3321301033	Pkg3231302034	Pkg3321201034
GHGI [kg/m2]	3.46	3.46	3.46	3.45	3.45	3.46	3.46	3.46	3.46	3.45
% ICC	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21.1	21.6	21.7	20.7	20.7	21.5	21.6	21.1	21.6	20.2
Output: MEUI [kWh/(m2 * yr)]	30.2	30.5	30.5	30.1	30.1	30.5	30.5	30.2	30.5	29.9
Output: Better than ERS (%)	4180.0%	4140.0%	4140.0%	4190.0%	4190.0%	4150.0%	4150.0%	4180.0%	4140.0%	4200.0%
Output: Better than Envelope (%)	4490.0%	4370.0%	4330.0%	4580.0%	4610.0%	4400.0%	4370.0%	4490.0%	4370.0%	4740.0%

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2586	2649	2642	2552	2545	2640	2637	2586	2649	2507
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 364.57	$ 373.45	$ 372.48	$ 359.87	$ 358.82	$ 372.21	$ 371.86	$ 364.57	$ 373.45	$ 353.43
Annual savings in carbon tax for electricity [$/year]	$ 1.29	$ 1.32	$ 1.32	$ 1.28	$ 1.27	$ 1.32	$ 1.32	$ 1.29	$ 1.32	$ 1.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 365.86	$ 374.78	$ 373.8	$ 361.15	$ 360.09	$ 373.53	$ 373.18	$ 365.86	$ 374.78	$ 354.68
Annual savings in GHG from electricity savings [kg CO2e/year]	28.4	29.1	29.1	28.1	28	29	29	28.4	29.1	27.6
Annual savings in natural gas [m3/year]	60.39	60.39	60.39	60.39	60.39	60.39	60.39	60.39	60.39	60.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51
Annual savings in carbon tax for natural gas [$/year]	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3
Net Present Value [$]	$ 9,441.01	$ 9,621.12	$ 9,681.01	$ 9,575.81	$ 9,650.99	$ 9,919.91	$ 9,991.12	$ 9,902.07	$ 10,082.18	$ 9,737.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	8.78	14.09	14.09	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR80	CeilR80	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 1,162.47	$ 1,162.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	5.28	7.04	7.04	7.04	5.28	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 544.22	$ 544.22	$ 229.26	$ 544.22	$ 229.26	$ 229.26	$ 229.26	$ 544.22	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilRS0 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 19,631.43	$ 19,866.47	$ 16,360.8	$ 19,927.83	$ 16,378.77	$ 19,952.86	$ 16,456.37	$ 20,099.24	$ 20,166.47	$ 20,162.87
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,064.52	$ 21,316.72	$ 17,555.14	$ 21,382.56	$ 17,574.42	$ 21,409.42	$ 17,657.69	$ 21,566.48	$ 21,638.62	$ 21,634.76
Net Present Value [$]	$ 15,441.38	$ 15,218.31	$ 9,441.01	$ 15,737.78	$ 9,621.12	$ 15,750.57	$ 9,681.01	$ 15,507.68	$ 15,227.27	$ 15,514.71
Incremental dollars per GHG saving	$ 5.24	$ 5.3	$ 5.32	$ 5.32	$ 5.33	$ 5.33	$ 5.35	$ 5.37	$ 5.38	$ 5.38
Auxiliary Energy Required Heating [GJ/yr]	18.1	18.3	17.8	18.1	18.2	18	18.3	18.3	18.2	18.3
Annual Energy DHW [GJ/yr]	7.8	7.3	13.5	7.8	13.5	7.8	13.5	7.3	6.9	7.3
Annual Energy Space Heating [GJ/yr]	7.6	7.5	7.3	7.6	7.6	7.6	7.6	7.6	7.5	7.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	46.2	45.6	51.6	46.2	51.9	46.2	51.9	45.7	45.2	45.6
Design Heating Load [W]	4961.2	5016.1	5183.8	4961.2	5303.7	4975.3	5195.8	5134.4	5016.1	5016.1
Annual Energy Electricity [kWh/yr]	12840.1	12662.1	10601.7	12840.1	10664.7	12835.3	10657.8	12684.1	12549.1	12662.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,753.56	$ 1,728.37	$ 1,436.83	$ 1,753.56	$ 1,445.74	$ 1,752.88	$ 1,444.76	$ 1,731.49	$ 1,712.38	$ 1,728.37
Annual Energy Natural Gas [m3/yr]	0	0	362.1	0	362.1	0	362.1	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 156.2	$.	$ 156.2	$.	$ 156.2	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51586	51011	43447	51874	37849	51154	45589	47789	51012	51299
Upgrade Package List	Pkg4331302034	Pkg4321302034	Pkg3321201033	Pkg4331402034	Pkg3231202034	Pkg4321303034	Pkg3331202032	Pkg3341203034	Pkg4321302034	Pkg4321402034
GHGI [kg/m2]	0.6	0.59	3.46	0.6	3.46	0.6	3.46	0.6	0.59	0.59
% ICC	3.8%	3.8%	3.1%	3.8%	3.1%	3.8%	3.1%	3.8%	3.9%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.5	21.7	21.1	21.5	21.6	21.3	21.7	21.7	21.5	21.7
Output: MEUI [kWh/(m2 * yr)]	23.8	23	30.2	23.8	30.5	23.8	30.5	23.1	22.6	23
Output: Better than ERS (%)	4800.0%	4860.0%	4180.0%	4800.0%	4140.0%	4800.0%	4140.0%	4850.0%	4910.0%	4860.0%
Output: Better than Envelope (%)	4400.0%	4330.0%	4490.0%	4400.0%	4370.0%	4430.0%	4330.0%	4330.0%	4370.0%	4330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4824	4646	2586	4824	2649	4819	2642	4668	4533	4646
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 680.18	$ 655.09	$ 364.57	$ 680.18	$ 373.45	$ 679.51	$ 372.48	$ 658.19	$ 639.15	$ 655.09
Annual savings in carbon tax for electricity [$/year]	$ 2.41	$ 2.32	$ 1.29	$ 2.41	$ 1.32	$ 2.41	$ 1.32	$ 2.33	$ 2.27	$ 2.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 682.6	$ 657.41	$ 365.86	$ 682.6	$ 374.78	$ 681.92	$ 373.8	$ 660.52	$ 641.42	$ 657.41
Annual savings in GHG from electricity savings [kg CO2e/year]	53.1	51.1	28.4	53.1	29.1	53	29.1	51.3	49.9	51.1
Annual savings in natural gas [m3/year]	73.88	73.88	60.39	73.88	60.39	73.88	60.39	73.88	73.88	73.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 684.5	$ 684.5	$ 559.51	$ 684.5	$ 559.51	$ 684.5	$ 559.51	$ 684.5	$ 684.5	$ 684.5
Annual savings in carbon tax for natural gas [$/year]	$ 170.85	$ 170.85	$ 139.65	$ 170.85	$ 139.65	$ 170.85	$ 139.65	$ 170.85	$ 170.85	$ 170.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 855.35	$ 855.35	$ 699.16	$ 855.35	$ 699.16	$ 855.35	$ 699.16	$ 855.35	$ 855.35	$ 855.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	3796.6	3796.6	3103.3	3796.6	3103.3	3796.6	3103.3	3796.6	3796.6	3796.6
Net Present Value [$]	$ 15,441.38	$ 15,218.31	$ 9,441.01	$ 15,737.78	$ 9,621.12	$ 15,750.57	$ 9,681.01	$ 15,507.68	$ 15,227.27	$ 15,514.71
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	10.51	14.09	10.51	14.09	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.22	$ 229.26	$ 229.26	$ 544.22	$ 544.22	$ 229.26	$ 544.22	$ 1,286.7	$ 229.26	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 2,214.76	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,360.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.

MEDIUM Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,360.8	$ 16,581.41	$ 16,378.77	$ 16,675.76	$ 16,456.37	$ 16,860.8	$ 16,910.8	$ 16,896.37	$ 17,081.41	$ 17,131.41
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,555.14	$ 17,791.85	$ 17,574.42	$ 17,893.09	$ 17,657.69	$ 18,091.64	$ 18,145.29	$ 18,129.81	$ 18,328.35	$ 18,382.
Net Present Value [$]	$ 9,441.01	$ 9,575.81	$ 9,621.12	$ 9,650.99	$ 9,681.01	$ 9,737.62	$ 9,748.44	$ 9,786.33	$ 9,864.01	$ 9,883.41
Incremental dollars per GHG saving	$ 5.32	$ 5.39	$ 5.33	$ 5.42	$ 5.35	$ 5.48	$ 5.4	$ 5.49	$ 5.55	$ 5.47
Auxiliary Energy Required Heating [GJ/yr]	17.8	17.5	18.2	17.4	18.3	17	17.8	17.1	16.6	17.5
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	7.3	7.2	7.6	7.2	7.6	7.1	7.3	7.1	6.9	7.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	51.6	51.5	51.9	51.5	51.9	51.4	50.6	51.4	51.2	50.4
Design Heating Load [W]	5183.8	5114.5	5303.7	5128.9	5195.8	5154.6	5183.8	5059.6	5085.3	5114.5
Annual Energy Electricity [kWh/yr]	10601.7	10568.4	10664.7	10560.9	10657.8	10522.7	10602.5	10527.8	10486.1	10569.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,436.83	$ 1,432.11	$ 1,445.74	$ 1,431.05	$ 1,444.76	$ 1,425.65	$ 1,436.94	$ 1,426.37	$ 1,420.47	$ 1,432.23
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	332.9	362.1	362.1	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 143.6
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43447	43663	37849	45391	45589	43465	43448	45607	43681	43664
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3321202034	Pkg3331201033	Pkg3331202032	Pkg3321201034	Pkg3321201033	Pkg3331202033	Pkg3321202034	Pkg3321202033
GHGI [kg/m2]	3.46	3.45	3.46	3.45	3.46	3.45	3.22	3.45	3.45	3.22
% ICC	3.1%	3.2%	3.1%	3.2%	3.1%	3.2%	3.2%	3.2%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21.1	20.7	21.6	20.7	21.7	20.2	21.1	20.2	19.7	20.7
Output: MEUI [kWh/(m2 * yr)]	30.2	30.1	30.5	30.1	30.5	29.9	28.9	29.9	29.7	28.8
Output: Better than ERS (%)	4180.0%	4190.0%	4140.0%	4190.0%	4140.0%	4200.0%	4290.0%	4200.0%	4220.0%	4310.0%
Output: Better than Envelope (%)	4490.0%	4580.0%	4370.0%	4610.0%	4330.0%	4740.0%	4490.0%	4710.0%	4860.0%	4580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2586	2552	2649	2545	2642	2507	2586	2512	2470	2553
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 364.57	$ 359.87	$ 373.45	$ 358.82	$ 372.48	$ 353.43	$ 364.68	$ 354.15	$ 348.27	$ 359.99
Annual savings in carbon tax for electricity [$/year]	$ 1.29	$ 1.28	$ 1.32	$ 1.27	$ 1.32	$ 1.25	$ 1.29	$ 1.26	$ 1.24	$ 1.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 365.86	$ 361.15	$ 374.78	$ 360.09	$ 373.8	$ 354.68	$ 365.98	$ 355.41	$ 349.5	$ 361.26
Annual savings in GHG from electricity savings [kg CO2e/year]	28.4	28.1	29.1	28	29.1	27.6	28.5	27.6	27.2	28.1
Annual savings in natural gas [m3/year]	60.39	60.39	60.39	60.39	60.39	60.39	61.48	60.39	60.39	61.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 559.51	$ 569.59	$ 559.51	$ 559.51	$ 569.59
Annual savings in carbon tax for natural gas [$/year]	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 139.65	$ 142.17	$ 139.65	$ 139.65	$ 142.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 699.16	$ 711.75	$ 699.16	$ 699.16	$ 711.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	3103.3	3103.3	3103.3	3103.3	3103.3	3103.3	3159.2	3103.3	3103.3	3159.2
Net Present Value [$]	$ 9,441.01	$ 9,575.81	$ 9,621.12	$ 9,650.99	$ 9,681.01	$ 9,737.62	$ 9,748.44	$ 9,786.33	$ 9,864.01	$ 9,883.41
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	10.51	8.78	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77	$ 1,238.77
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.26	$ 229.26	$ 544.22	$ 544.22	$ 544.22	$ 229.26	$ 229.26	$ 544.22	$ 229.26	$ 229.26
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

MEDIUM Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,309.46	$ 6,409.46	$ 6,530.07	$ 6,624.39	$ 6,630.07	$ 6,724.39	$ 6,845.	$ 6,859.46	$ 6,909.46	$ 6,945.
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 7,104.45	$ 7,217.05	$ 7,352.86	$ 7,459.06	$ 7,465.46	$ 7,571.66	$ 7,707.47	$ 7,723.75	$ 7,780.05	$ 7,820.07
Net Present Value [$]	$ 3,316.88	$ 4,048.89	$ 3,215.74	$ 3,137.19	$ 3,950.78	$ 3,868.65	$ 3,036.05	$ 3,084.27	$ 4,652.4	$ 3,770.3
Incremental dollars per GHG saving	$ 3.43	$ 3.13	$ 3.5	$ 3.54	$ 3.19	$ 3.23	$ 3.61	$ 3.58	$ 3.02	$ 3.3
Auxiliary Energy Required Heating [GJ/yr]	37.4	43.4	36.9	36.9	43	42.9	36.4	37.4	39	42.4
Annual Energy DHW [GJ/yr]	24.6	14.3	24.6	24.6	14.3	14.3	24.6	23.2	14.3	14.3
Annual Energy Space Heating [GJ/yr]	39.6	46	39.1	39	45.5	45.4	38.5	39.6	41.3	44.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	90.6	86.7	90.1	90	86.1	86.1	89.5	89.2	81.9	85.6
Design Heating Load [W]	9139.8	9755	9049.9	9075.5	9665.1	9690.7	8985.6	9139.8	8854.1	9600.8
Annual Energy Electricity [kWh/yr]	7524.3	7556.3	7521.8	7521.5	7553.7	7553.5	7519	7524.3	7532.8	7550.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,001.37	$ 1,005.9	$ 1,001.02	$ 1,000.98	$ 1,005.53	$ 1,005.51	$ 1,000.62	$ 1,001.37	$ 1,002.58	$ 1,005.14
Annual Energy Natural Gas [m3/yr]	1705.5	1596.3	1692	1690.2	1582.5	1581.1	1676.7	1667.6	1471.8	1567.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 735.69	$ 688.59	$ 729.87	$ 729.09	$ 682.64	$ 682.03	$ 723.27	$ 719.34	$ 634.88	$ 676.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	1732	11719	13069	2002	3352	13339	11450	11452	3622
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg2131101031	Pkg1121102031	Pkg1131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg1131102031
GHGI [kg/m2]	14.28	13.39	14.17	14.16	13.28	13.27	14.05	13.97	12.38	13.16
% ICC	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	44.3	51.5	43.7	43.7	50.9	50.8	43.1	44.3	46.2	50.3
Output: MEUI [kWh/(m2 * yr)]	77	72.3	76.4	76.3	71.7	71.6	75.7	75.3	66.7	71
Output: Better than ERS (%)	2090.0%	2020.0%	2140.0%	2150.0%	2080.0%	2080.0%	2190.0%	2220.0%	2470.0%	2130.0%
Output: Better than Envelope (%)	1320.0%	70.0%	1440.0%	1440.0%	20.0%	50.0%	1550.0%	1320.0%	950.0%	160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	620	588	622	623	590	591	625	620	611	593
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 87.41	$ 82.89	$ 87.76	$ 87.8	$ 83.26	$ 83.29	$ 88.15	$ 87.41	$ 86.21	$ 83.66
Annual savings in carbon tax for electricity [$/year]	$ .31	$ .29	$ .31	$ .31	$ .3	$ .3	$ .31	$ .31	$ .31	$ .3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 87.72	$ 83.19	$ 88.07	$ 88.11	$ 83.56	$ 83.58	$ 88.47	$ 87.72	$ 86.51	$ 83.95
Annual savings in GHG from electricity savings [kg CO2e/year]	6.8	6.5	6.8	6.8	6.5	6.5	6.9	6.8	6.7	6.5
Annual savings in natural gas [m3/year]	35.72	39.79	36.22	36.29	40.3	40.36	36.79	37.13	44.43	40.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 330.95	$ 368.64	$ 335.61	$ 336.23	$ 373.41	$ 373.89	$ 340.89	$ 344.03	$ 411.62	$ 378.65
Annual savings in carbon tax for natural gas [$/year]	$ 82.6	$ 92.01	$ 83.77	$ 83.92	$ 93.2	$ 93.32	$ 85.08	$ 85.87	$ 102.74	$ 94.51
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 413.55	$ 460.65	$ 419.37	$ 420.15	$ 466.61	$ 467.21	$ 425.97	$ 429.9	$ 514.36	$ 473.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	1835.6	2044.7	1861.5	1864.9	2071.1	2073.8	1890.8	1908.2	2283.1	2100.2
Net Present Value [$]	$ 3,316.88	$ 4,048.89	$ 3,215.74	$ 3,137.19	$ 3,950.78	$ 3,868.65	$ 3,036.05	$ 3,084.27	$ 4,652.4	$ 3,770.3
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,820.7	$ 10,333.46	$ 9,041.31	$ 10,554.07	$ 9,135.63	$ 10,648.39	$ 9,370.7	$ 10,833.46	$ 10,869.	$ 10,883.46
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 9,932.11	$ 11,635.48	$ 10,180.52	$ 11,883.88	$ 10,286.72	$ 11,990.09	$ 10,551.41	$ 12,198.48	$ 12,238.49	$ 12,254.78
Net Present Value [$]	$ 2,609.83	$ 7,032.5	$ 2,711.58	$ 7,124.39	$ 2,777.42	$ 7,203.	$ 2,892.02	$ 6,214.6	$ 7,280.65	$ 7,068.52
Incremental dollars per GHG saving	$ 2.05	$ 2.06	$ 2.1	$ 2.1	$ 2.12	$ 2.12	$ 2.14	$ 2.16	$ 2.17	$ 2.17
Auxiliary Energy Required Heating [GJ/yr]	48.9	47.6	48.4	47.1	48.4	47.1	48.9	43.1	46.6	47.4
Annual Energy DHW [GJ/yr]	14.3	8.2	14.3	8.2	14.3	8.2	13	8.2	8.2	7.6
Annual Energy Space Heating [GJ/yr]	19.4	19.3	19.3	19.1	19.2	19.1	19.4	17.4	18.9	19.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	61.6	55.9	61.4	55.7	61.4	55.7	60.4	54.1	55.5	55.2
Design Heating Load [W]	9523.5	10127.4	9433.5	10037.5	9459.2	10063.1	9523.5	9218.7	9973.2	10127.4
Annual Energy Electricity [kWh/yr]	13154.8	15530.2	13108.6	15480.2	13097.5	15474.1	13155.8	15018.3	15418.6	15330.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,798.09	$ 2,134.21	$ 1,791.55	$ 2,127.13	$ 1,789.98	$ 2,126.27	$ 1,798.23	$ 2,061.77	$ 2,118.42	$ 2,105.96
Annual Energy Natural Gas [m3/yr]	382.7	0	382.7	0	382.7	0	350.4	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$.	$ 165.08	$.	$ 165.08	$.	$ 151.15	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11353	1744	11623	2014	12973	3364	11354	11464	3634	1745
Upgrade Package List	Pkg2121101011	Pkg1121101031	Pkg2121102011	Pkg1121102031	Pkg2131101011	Pkg1131101031	Pkg2121101011	Pkg2121101031	Pkg1131102031	Pkg1121101031
GHGI [kg/m2]	3.74	0.73	3.74	0.73	3.74	0.73	3.48	0.7	0.72	0.72
% ICC	1.7%	2.0%	1.7%	2.0%	1.7%	2.0%	1.8%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	58	56.5	57.4	55.9	57.3	55.8	58	51.1	55.2	56.1
Output: MEUI [kWh/(m2 * yr)]	42.4	35.6	42.2	35.3	42.2	35.3	41	33.4	35.1	34.7
Output: Better than ERS (%)	4290.0%	4840.0%	4310.0%	4860.0%	4310.0%	4860.0%	4400.0%	5010.0%	4880.0%	4910.0%
Output: Better than Envelope (%)	1350.0%	1040.0%	1230.0%	930.0%	1230.0%	930.0%	1350.0%	0.0%	810.0%	1000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5011	7386	4964	7336	4953	7330	5012	6874	7274	7186
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 706.49	$ 1,041.43	$ 699.98	$ 1,034.38	$ 698.42	$ 1,033.52	$ 706.64	$ 969.25	$ 1,025.69	$ 1,013.28
Annual savings in carbon tax for electricity [$/year]	$ 2.51	$ 3.69	$ 2.48	$ 3.67	$ 2.48	$ 3.66	$ 2.51	$ 3.44	$ 3.64	$ 3.59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 709.	$ 1,045.12	$ 702.46	$ 1,038.04	$ 700.89	$ 1,037.18	$ 709.14	$ 972.69	$ 1,029.33	$ 1,016.88
Annual savings in GHG from electricity savings [kg CO2e/year]	55.1	81.2	54.6	80.7	54.5	80.6	55.1	75.6	80	79.1
Annual savings in natural gas [m3/year]	85.01	99.27	85.01	99.27	85.01	99.27	86.21	99.27	99.27	99.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 787.58	$ 919.69	$ 787.58	$ 919.69	$ 787.58	$ 919.69	$ 798.73	$ 919.69	$ 919.69	$ 919.69
Annual savings in carbon tax for natural gas [$/year]	$ 196.58	$ 229.55	$ 196.58	$ 229.55	$ 196.58	$ 229.55	$ 199.36	$ 229.55	$ 229.55	$ 229.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 984.16	$ 1,149.24	$ 984.16	$ 1,149.24	$ 984.16	$ 1,149.24	$ 998.09	$ 1,149.24	$ 1,149.24	$ 1,149.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	4368.4	5101.1	4368.4	5101.1	4368.4	5101.1	4430.2	5101.1	5101.1	5101.1
Net Present Value [$]	$ 2,609.83	$ 7,032.5	$ 2,711.58	$ 7,124.39	$ 2,777.42	$ 7,203.	$ 2,892.02	$ 6,214.6	$ 7,280.65	$ 7,068.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$ 1,238.76	$.	$ 1,238.76	$.	$ 1,238.76	$.	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

MEDIUM Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,909.46	$ 7,130.07	$ 7,224.39	$ 7,445.	$ 7,459.46	$ 7,680.07	$ 7,759.46	$ 7,774.39	$ 8,435.86	$ 7,980.07
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 7,780.05	$ 8,028.46	$ 8,134.66	$ 8,383.07	$ 8,399.35	$ 8,647.76	$ 8,737.15	$ 8,753.96	$ 9,498.78	$ 8,985.56
Net Present Value [$]	$ 4,652.4	$ 4,553.86	$ 4,472.35	$ 4,373.08	$ 4,371.25	$ 4,271.99	$ 4,245.11	$ 4,190.83	$ 4,155.85	$ 4,146.99
Incremental dollars per GHG saving	$ 3.02	$ 3.08	$ 3.12	$ 3.18	$ 3.17	$ 3.23	$ 3.25	$ 3.27	$ 3.36	$ 3.3
Auxiliary Energy Required Heating [GJ/yr]	39	38.5	38.4	38	39	38.5	39	38.5	34.8	38.5
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	13	12.3	13	14.3	12.3
Annual Energy Space Heating [GJ/yr]	41.3	40.8	40.7	40.2	41.3	40.8	41.3	40.7	36.9	40.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	81.9	81.4	81.4	80.8	80.7	80.2	80	80.2	77.5	79.4
Design Heating Load [W]	8854.1	8764.1	8789.8	8699.9	8854.1	8764.1	8854.1	8789.8	8338.5	8764.1
Annual Energy Electricity [kWh/yr]	7532.8	7530.2	7529.9	7527.3	7532.8	7530.2	7532.9	7530	7510.8	7530.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,002.58	$ 1,002.21	$ 1,002.17	$ 1,001.8	$ 1,002.58	$ 1,002.21	$ 1,002.59	$ 1,002.18	$ 999.46	$ 1,002.22
Annual Energy Natural Gas [m3/yr]	1471.8	1458	1456.6	1442.9	1439.7	1426	1418.9	1424.5	1355.6	1405.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 634.88	$ 628.93	$ 628.33	$ 622.42	$ 621.04	$ 615.13	$ 612.06	$ 614.48	$ 584.76	$ 606.11
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	13342	11453	11723	11454	13073	17824	11724
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2122102031	Pkg2121101031	Pkg2131101031	Pkg2221101031	Pkg2122102031
GHGI [kg/m2]	12.38	12.26	12.25	12.14	12.11	12	11.94	11.99	11.43	11.83
% ICC	1.3%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.6%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.2	45.6	45.6	45	46.2	45.6	46.2	45.6	41.3	45.6
Output: MEUI [kWh/(m2 * yr)]	66.7	66.1	66	65.4	65.3	64.7	64.4	64.6	61.5	63.8
Output: Better than ERS (%)	2470.0%	2510.0%	2510.0%	2570.0%	2580.0%	2620.0%	2640.0%	2620.0%	2870.0%	2700.0%
Output: Better than Envelope (%)	950.0%	1070.0%	1090.0%	1180.0%	950.0%	1070.0%	950.0%	1070.0%	1930.0%	1070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	611	614	614	617	611	614	611	614	633	614
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 86.21	$ 86.57	$ 86.62	$ 86.98	$ 86.21	$ 86.57	$ 86.19	$ 86.6	$ 89.31	$ 86.56
Annual savings in carbon tax for electricity [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .32	$ .31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 86.51	$ 86.88	$ 86.92	$ 87.29	$ 86.51	$ 86.88	$ 86.5	$ 86.91	$ 89.63	$ 86.87
Annual savings in GHG from electricity savings [kg CO2e/year]	6.7	6.8	6.8	6.8	6.7	6.8	6.7	6.8	7	6.8
Annual savings in natural gas [m3/year]	44.43	44.94	44.99	45.5	45.62	46.13	46.4	46.19	48.76	46.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 411.62	$ 416.38	$ 416.87	$ 421.6	$ 422.7	$ 427.43	$ 429.88	$ 427.95	$ 451.73	$ 434.65
Annual savings in carbon tax for natural gas [$/year]	$ 102.74	$ 103.93	$ 104.05	$ 105.23	$ 105.5	$ 106.68	$ 107.3	$ 106.81	$ 112.75	$ 108.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 514.36	$ 520.31	$ 520.92	$ 526.83	$ 528.21	$ 534.12	$ 537.18	$ 534.76	$ 564.48	$ 543.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	2283.1	2309.5	2312.2	2338.4	2344.5	2370.8	2384.4	2373.6	2505.6	2410.8
Net Present Value [$]	$ 4,652.4	$ 4,553.86	$ 4,472.35	$ 4,373.08	$ 4,371.25	$ 4,271.99	$ 4,245.11	$ 4,190.83	$ 4,155.85	$ 4,146.99
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$.	$ 850.

MEDIUM Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 9,459.46	$ 9,680.07	$ 9,774.39	$ 9,995.	$ 10,009.46	$ 10,230.07	$ 10,280.07	$ 10,309.46	$ 10,324.39	$ 10,374.39
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 10,651.35	$ 10,899.76	$ 11,005.96	$ 11,254.37	$ 11,270.65	$ 11,519.06	$ 11,575.36	$ 11,608.45	$ 11,625.26	$ 11,681.56
Net Present Value [$]	$ 3,092.21	$ 3,187.38	$ 3,264.25	$ 3,346.09	$ 3,324.59	$ 3,420.	$ 1,735.22	$ 3,418.58	$ 3,496.87	$ 1,815.66
Incremental dollars per GHG saving	$ 2.5	$ 2.55	$ 2.58	$ 2.64	$ 2.59	$ 2.65	$ 2.38	$ 2.64	$ 2.67	$ 2.4
Auxiliary Energy Required Heating [GJ/yr]	37.3	36.8	36.8	36.3	37.3	36.8	38.4	37.3	36.8	38.3
Annual Energy DHW [GJ/yr]	24.6	24.6	24.6	24.6	23.2	23.2	14.3	22.3	23.2	14.3
Annual Energy Space Heating [GJ/yr]	15.4	15.2	15.2	15	15.4	15.2	15.7	15.4	15.2	15.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	68.5	68.3	68.3	68.1	67.1	66.9	58.3	66.2	66.9	58.3
Design Heating Load [W]	9218.7	9128.8	9154.4	9064.5	9218.7	9128.8	8841.7	9218.7	9154.4	8867.3
Annual Energy Electricity [kWh/yr]	12187.9	12138.9	12133.4	12079.5	12187.9	12138.9	12248.2	12187.9	12133.4	12242.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,661.27	$ 1,654.34	$ 1,653.56	$ 1,645.93	$ 1,661.27	$ 1,654.34	$ 1,669.81	$ 1,661.27	$ 1,653.56	$ 1,669.04
Annual Energy Natural Gas [m3/yr]	661.2	661.3	660.9	660.9	623.3	623.4	382.7	598.7	623	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.22	$ 285.26	$ 285.09	$ 285.09	$ 268.87	$ 268.91	$ 165.08	$ 258.26	$ 268.74	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11458	11728	13078	13348	11459	11729	11731	11460	13079	13081
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2122102031	Pkg2122102031	Pkg2121101031	Pkg2131101031	Pkg2131101031
GHGI [kg/m2]	5.97	5.97	5.97	5.97	5.66	5.66	3.7	5.46	5.66	3.7
% ICC	1.8%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	44.2	43.7	43.6	43	44.2	43.7	45.5	44.2	43.6	45.4
Output: MEUI [kWh/(m2 * yr)]	50.5	50.3	50.2	50	48.8	48.6	38.4	47.7	48.6	38.4
Output: Better than ERS (%)	3990.0%	4010.0%	4010.0%	4030.0%	4110.0%	4130.0%	4600.0%	4190.0%	4130.0%	4600.0%
Output: Better than Envelope (%)	1350.0%	1460.0%	1460.0%	1580.0%	1350.0%	1460.0%	1090.0%	1350.0%	1460.0%	1110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4044	3995	3989	3935	4044	3995	4104	4044	3989	4099
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 570.16	$ 563.25	$ 562.48	$ 554.88	$ 570.16	$ 563.25	$ 578.66	$ 570.16	$ 562.48	$ 577.9
Annual savings in carbon tax for electricity [$/year]	$ 2.02	$ 2.	$ 1.99	$ 1.97	$ 2.02	$ 2.	$ 2.05	$ 2.02	$ 1.99	$ 2.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 572.18	$ 565.25	$ 564.47	$ 556.84	$ 572.18	$ 565.25	$ 580.72	$ 572.18	$ 564.47	$ 579.95
Annual savings in GHG from electricity savings [kg CO2e/year]	44.5	43.9	43.9	43.3	44.5	43.9	45.1	44.5	43.9	45.1
Annual savings in natural gas [m3/year]	74.63	74.63	74.64	74.64	76.04	76.04	85.01	76.96	76.05	85.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 691.44	$ 691.41	$ 691.55	$ 691.55	$ 704.53	$ 704.49	$ 787.58	$ 713.02	$ 704.63	$ 787.58
Annual savings in carbon tax for natural gas [$/year]	$ 172.58	$ 172.57	$ 172.61	$ 172.61	$ 175.85	$ 175.84	$ 196.58	$ 177.97	$ 175.87	$ 196.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 864.02	$ 863.98	$ 864.15	$ 864.15	$ 880.37	$ 880.33	$ 984.16	$ 890.98	$ 880.5	$ 984.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	3835.1	3834.9	3835.7	3835.7	3907.7	3907.5	4368.4	3954.8	3908.3	4368.4
Net Present Value [$]	$ 3,092.21	$ 3,187.38	$ 3,264.25	$ 3,346.09	$ 3,324.59	$ 3,420.	$ 1,735.22	$ 3,418.58	$ 3,496.87	$ 1,815.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 550.	$.

MEDIUM Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 10,280.07	$ 10,374.39	$ 10,595.	$ 10,830.07	$ 10,924.39	$ 9,459.46	$ 12,580.47	$ 11,130.07	$ 12,674.79	$ 11,224.39
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 11,575.36	$ 11,681.56	$ 11,929.97	$ 12,194.66	$ 12,300.86	$ 10,651.35	$ 14,165.61	$ 12,532.46	$ 14,271.81	$ 12,638.66
Net Present Value [$]	$ 1,735.22	$ 1,815.66	$ 1,909.19	$ 2,017.23	$ 2,097.67	$ 3,092.21	$ 6,745.6	$ 2,143.13	$ 6,830.42	$ 2,223.39
Incremental dollars per GHG saving	$ 2.38	$ 2.4	$ 2.45	$ 2.47	$ 2.49	$ 2.5	$ 2.5	$ 2.52	$ 2.52	$ 2.54
Auxiliary Energy Required Heating [GJ/yr]	38.4	38.3	37.9	38.4	38.4	37.3	38.4	38.4	38.4	38.4
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	13	24.6	8.2	12.3	8.2	12.3
Annual Energy Space Heating [GJ/yr]	15.7	15.7	15.5	15.7	15.7	15.4	15.7	15.7	15.6	15.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	58.3	58.3	58.1	57.1	57.1	68.5	52.4	56.4	52.4	56.3
Design Heating Load [W]	8841.7	8867.3	8777.4	8841.7	8867.3	9218.7	8613.2	8841.7	8638.9	8867.3
Annual Energy Electricity [kWh/yr]	12248.2	12242.8	12193.4	12249.2	12243.8	12187.9	14546	12249.9	14542.3	12244.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,669.81	$ 1,669.04	$ 1,662.05	$ 1,669.95	$ 1,669.18	$ 1,661.27	$ 1,994.94	$ 1,670.05	$ 1,994.42	$ 1,669.27
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	350.4	661.2	0	329.4	0	329.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 151.15	$ 285.22	$.	$ 142.09	$.	$ 142.09
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11731	13081	13351	11732	13082	11458	18106	11733	20968	13083
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2221102031	Pkg2121102031	Pkg2231101031	Pkg2131101031
GHGI [kg/m2]	3.7	3.7	3.7	3.44	3.44	5.97	0.68	3.27	0.68	3.27
% ICC	2.0%	2.0%	2.0%	2.1%	2.1%	1.8%	2.4%	2.1%	2.4%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.5	45.4	44.9	45.5	45.5	44.2	45.5	45.5	45.5	45.5
Output: MEUI [kWh/(m2 * yr)]	38.4	38.4	38.2	37	37	50.5	31.3	36.1	31.3	36.1
Output: Better than ERS (%)	4600.0%	4600.0%	4620.0%	4710.0%	4710.0%	3990.0%	5170.0%	4770.0%	5170.0%	4780.0%
Output: Better than Envelope (%)	1090.0%	1110.0%	1210.0%	1090.0%	1090.0%	1350.0%	1090.0%	1090.0%	1090.0%	1090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4104	4099	4049	4105	4100	4044	6402	4106	6398	4100
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 578.66	$ 577.9	$ 570.94	$ 578.8	$ 578.04	$ 570.16	$ 902.65	$ 578.9	$ 902.13	$ 578.13
Annual savings in carbon tax for electricity [$/year]	$ 2.05	$ 2.05	$ 2.02	$ 2.05	$ 2.05	$ 2.02	$ 3.2	$ 2.05	$ 3.2	$ 2.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 580.72	$ 579.95	$ 572.96	$ 580.86	$ 580.09	$ 572.18	$ 905.85	$ 580.96	$ 905.33	$ 580.18
Annual savings in GHG from electricity savings [kg CO2e/year]	45.1	45.1	44.5	45.2	45.1	44.5	70.4	45.2	70.4	45.1
Annual savings in natural gas [m3/year]	85.01	85.01	85.01	86.21	86.21	74.63	99.27	86.99	99.27	86.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 787.58	$ 787.58	$ 787.58	$ 798.73	$ 798.73	$ 691.44	$ 919.69	$ 805.98	$ 919.69	$ 805.98
Annual savings in carbon tax for natural gas [$/year]	$ 196.58	$ 196.58	$ 196.58	$ 199.36	$ 199.36	$ 172.58	$ 229.55	$ 201.17	$ 229.55	$ 201.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 984.16	$ 984.16	$ 984.16	$ 998.09	$ 998.09	$ 864.02	$ 1,149.24	$ 1,007.15	$ 1,149.24	$ 1,007.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	4368.4	4368.4	4368.4	4430.2	4430.2	3835.1	5101.1	4470.4	5101.1	4470.4
Net Present Value [$]	$ 1,735.22	$ 1,815.66	$ 1,909.19	$ 2,017.23	$ 2,097.67	$ 3,092.21	$ 6,745.6	$ 2,143.13	$ 6,830.42	$ 2,223.39
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 4,812.4	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 1,374.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$.	$ 850.

MEDIUM Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,621.4	$ 12,693.16	$ 12,743.16	$ 12,728.7	$ 12,770.76	$ 12,913.77	$ 13,210.76	$ 12,710.76	$ 12,963.77	$ 13,043.16
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,085.7	$ 14,292.5	$ 14,348.8	$ 14,332.52	$ 14,379.88	$ 14,540.91	$ 14,875.32	$ 14,312.32	$ 14,597.21	$ 14,686.6
Net Present Value [$]	$ 1,796.84	$ 832.31	$ 781.83	$ 773.89	$ 753.25	$ 730.62	$ 725.34	$ 702.95	$ 680.69	$ 656.05
Incremental dollars per GHG saving	$ 4.09	$ 4.44	$ 4.45	$ 4.46	$ 4.47	$ 4.48	$ 4.48	$ 4.48	$ 4.49	$ 4.49
Auxiliary Energy Required Heating [GJ/yr]	30.5	28.3	29.4	28.4	28.3	27.8	26.6	28.8	28.9	29.4
Annual Energy DHW [GJ/yr]	12.3	14.3	13	14.3	14.3	14.3	14.3	14.3	13	12.3
Annual Energy Space Heating [GJ/yr]	32.4	30	31.1	30.1	30	29.5	28.2	30.5	30.6	31.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	71.9	71.6	71.5	71.7	71.6	71.1	69.8	72	71	70.7
Design Heating Load [W]	7313.7	6982.7	7020.6	6866.4	6842.8	6892.8	6666.1	7113.5	6930.7	7020.6
Annual Energy Electricity [kWh/yr]	7753	7741.2	7747	7741.7	7741.2	7738.7	7732.4	7743.6	7744.5	7747
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,033.73	$ 1,032.06	$ 1,032.89	$ 1,032.14	$ 1,032.06	$ 1,031.71	$ 1,030.82	$ 1,032.4	$ 1,032.53	$ 1,032.89
Annual Energy Natural Gas [m3/yr]	1182.5	1173.3	1171.6	1175.9	1173.5	1159.9	1127	1185.9	1158.1	1150.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 510.09	$ 506.12	$ 505.39	$ 507.24	$ 506.21	$ 500.34	$ 486.15	$ 511.56	$ 499.56	$ 496.42
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21264	35680	35663	37822	43420	35896	43438	27886	35879	35664
Upgrade Package List	Pkg2231102033	Pkg3221201034	Pkg3221201033	Pkg3231202033	Pkg3321201032	Pkg3221202034	Pkg3321201033	Pkg2321201033	Pkg3221202033	Pkg3221201033
GHGI [kg/m2]	10.02	9.95	9.93	9.97	9.95	9.84	9.57	10.05	9.82	9.76
% ICC	2.2%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.4%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	36.2	33.5	34.8	33.7	33.6	33	31.6	34.1	34.3	34.9
Output: MEUI [kWh/(m2 * yr)]	54.9	54.4	54.4	54.6	54.5	53.8	52.4	55	53.8	53.5
Output: Better than ERS (%)	3390.0%	3410.0%	3420.0%	3400.0%	3410.0%	3460.0%	3580.0%	3380.0%	3470.0%	3500.0%
Output: Better than Envelope (%)	2920.0%	3430.0%	3180.0%	3410.0%	3430.0%	3550.0%	3830.0%	3320.0%	3290.0%	3180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	391	403	397	402	403	406	412	401	400	397
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 55.16	$ 56.82	$ 56.01	$ 56.75	$ 56.82	$ 57.18	$ 58.06	$ 56.48	$ 56.36	$ 56.01
Annual savings in carbon tax for electricity [$/year]	$ .2	$ .2	$ .2	$ .2	$ .2	$ .2	$ .21	$ .2	$ .2	$ .2
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 55.35	$ 57.02	$ 56.2	$ 56.95	$ 57.02	$ 57.38	$ 58.27	$ 56.68	$ 56.56	$ 56.2
Annual savings in GHG from electricity savings [kg CO2e/year]	4.3	4.4	4.4	4.4	4.4	4.5	4.5	4.4	4.4	4.4
Annual savings in natural gas [m3/year]	55.21	55.55	55.61	55.45	55.54	56.05	57.27	55.08	56.12	56.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 511.49	$ 514.66	$ 515.25	$ 513.77	$ 514.6	$ 519.29	$ 530.65	$ 510.31	$ 519.91	$ 522.43
Annual savings in carbon tax for natural gas [$/year]	$ 127.67	$ 128.46	$ 128.6	$ 128.23	$ 128.44	$ 129.61	$ 132.45	$ 127.37	$ 129.77	$ 130.4
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 639.15	$ 643.12	$ 643.86	$ 642.	$ 643.04	$ 648.9	$ 663.09	$ 637.69	$ 649.68	$ 652.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	2837	2854.6	2857.9	2849.6	2854.2	2880.3	2943.3	2830.5	2883.7	2897.7
Net Present Value [$]	$ 1,796.84	$ 832.31	$ 781.83	$ 773.89	$ 753.25	$ 730.62	$ 725.34	$ 702.95	$ 680.69	$ 656.05
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	7.04	5.28	7.04	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 30	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 550.	$.	$.	$.	$.	$.	$ 550.	$ 850.

MEDIUM Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,810.76	$ 16,846.3	$ 17,031.37	$ 17,110.76	$ 17,125.69	$ 17,146.3	$ 17,167.76	$ 17,271.82	$ 17,307.36	$ 17,331.37
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,928.92	$ 18,968.93	$ 19,177.32	$ 19,266.72	$ 19,283.53	$ 19,306.73	$ 19,330.9	$ 19,448.07	$ 19,488.09	$ 19,515.12
Net Present Value [$]	$ 7,359.45	$ 7,402.19	$ 7,455.36	$ 7,453.45	$ 7,540.86	$ 7,495.21	$ 7,695.09	$ 7,820.51	$ 7,863.25	$ 7,549.35
Incremental dollars per GHG saving	$ 4.34	$ 4.35	$ 4.4	$ 4.37	$ 4.42	$ 4.37	$ 4.43	$ 4.46	$ 4.47	$ 4.42
Auxiliary Energy Required Heating [GJ/yr]	24.1	24.2	23.7	24.1	23.7	24.2	24.1	24.1	24.2	23.7
Annual Energy DHW [GJ/yr]	23.3	23.2	23.3	22.3	23.2	22.3	23.2	23.3	23.2	22.3
Annual Energy Space Heating [GJ/yr]	10.2	10.3	10.1	10.2	10.1	10.3	10.2	10.2	10.3	10.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	63.2	63.2	63.1	62.3	63.1	62.3	63.2	63.2	63.2	62.2
Design Heating Load [W]	6977.6	6861.3	6887.7	6977.6	6913.4	6861.3	6872.7	6977.6	6861.3	6887.7
Annual Energy Electricity [kWh/yr]	11110	11114.1	11061.3	11110	11059.1	11114.1	11101.7	11110	11114.1	11061.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,508.75	$ 1,509.33	$ 1,501.86	$ 1,508.75	$ 1,501.55	$ 1,509.33	$ 1,507.58	$ 1,508.75	$ 1,509.33	$ 1,501.86
Annual Energy Natural Gas [m3/yr]	624.3	623.9	624.4	599.7	624	599.2	624.3	624.3	623.9	599.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 269.3	$ 269.13	$ 269.34	$ 258.69	$ 269.17	$ 258.47	$ 269.3	$ 269.3	$ 269.13	$ 258.73
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43463	45605	43679	43464	45407	45606	43877	44111	46253	43680
Upgrade Package List	Pkg3321201034	Pkg3331202033	Pkg3321202034	Pkg3321201034	Pkg3331201034	Pkg3331202033	Pkg3321203033	Pkg3321301034	Pkg3331302033	Pkg3321202034
GHGI [kg/m2]	5.62	5.62	5.62	5.42	5.62	5.42	5.62	5.62	5.62	5.42
% ICC	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	28.6	28.7	28	28.6	28	28.7	28.5	28.6	28.7	28
Output: MEUI [kWh/(m2 * yr)]	44.2	44.2	44	43.1	44	43.1	44.2	44.2	44.2	42.9
Output: Better than ERS (%)	4460.0%	4460.0%	4460.0%	4540.0%	4460.0%	4540.0%	4460.0%	4460.0%	4460.0%	4540.0%
Output: Better than Envelope (%)	4410.0%	4390.0%	4500.0%	4410.0%	4500.0%	4390.0%	4410.0%	4410.0%	4390.0%	4500.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2966	2970	2917	2966	2915	2970	2958	2966	2970	2917
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 418.18	$ 418.76	$ 411.31	$ 418.18	$ 411.	$ 418.76	$ 417.01	$ 418.18	$ 418.76	$ 411.31
Annual savings in carbon tax for electricity [$/year]	$ 1.48	$ 1.48	$ 1.46	$ 1.48	$ 1.46	$ 1.48	$ 1.48	$ 1.48	$ 1.48	$ 1.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 419.66	$ 420.24	$ 412.77	$ 419.66	$ 412.46	$ 420.24	$ 418.49	$ 419.66	$ 420.24	$ 412.77
Annual savings in GHG from electricity savings [kg CO2e/year]	32.6	32.7	32.1	32.6	32.1	32.7	32.5	32.6	32.7	32.1
Annual savings in natural gas [m3/year]	76	76.02	76	76.92	76.02	76.94	76	76	76.02	76.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 704.18	$ 704.32	$ 704.15	$ 712.67	$ 704.28	$ 712.85	$ 704.18	$ 704.18	$ 704.32	$ 712.64
Annual savings in carbon tax for natural gas [$/year]	$ 175.76	$ 175.79	$ 175.75	$ 177.88	$ 175.79	$ 177.92	$ 175.76	$ 175.76	$ 175.79	$ 177.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 879.94	$ 880.11	$ 879.9	$ 890.55	$ 880.07	$ 890.77	$ 879.94	$ 879.94	$ 880.11	$ 890.51
Annual savings in GHG from natural gas savings [kg CO2e/year]	3905.8	3906.6	3905.6	3952.9	3906.4	3953.8	3905.8	3905.8	3906.6	3952.7
Net Present Value [$]	$ 7,359.45	$ 7,402.19	$ 7,455.36	$ 7,453.45	$ 7,540.86	$ 7,495.21	$ 7,695.09	$ 7,820.51	$ 7,863.25	$ 7,549.35
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	10.51	14.09	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 1,162.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,938.36	$ 1,918.36	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.	$ 550.	$ 850.

MEDIUM Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 17,717.76	$ 18,267.76	$ 18,032.69	$ 18,042.43	$ 18,138.69	$ 18,567.76	$ 18,178.82	$ 18,582.69	$ 18,592.43	$ 18,338.83
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 19,950.2	$ 20,569.5	$ 20,304.81	$ 20,315.78	$ 20,424.16	$ 20,907.3	$ 20,469.35	$ 20,924.11	$ 20,935.08	$ 20,649.52
Net Present Value [$]	$ 6,251.	$ 6,533.01	$ 6,435.2	$ 6,504.83	$ 6,594.7	$ 6,658.37	$ 6,712.06	$ 6,716.84	$ 6,786.65	$ 6,801.23
Incremental dollars per GHG saving	$ 4.09	$ 4.15	$ 4.16	$ 4.16	$ 4.18	$ 4.18	$ 4.19	$ 4.23	$ 4.23	$ 4.23
Auxiliary Energy Required Heating [GJ/yr]	24.4	24.4	23.9	24.4	24.2	24.4	24.4	23.9	24.5	24.4
Annual Energy DHW [GJ/yr]	14.3	13	14.3	14.3	14.3	12.3	14.3	13	13	14.3
Annual Energy Space Heating [GJ/yr]	10.3	10.3	10.1	10.2	10.2	10.3	10.3	10.1	10.2	10.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	54.3	53.1	54.1	54.2	54.2	52.3	54.3	52.9	53	54.2
Design Heating Load [W]	6559	6559	6494.8	6290.4	6502.9	6559	6559	6494.8	6290.4	6290.4
Annual Energy Electricity [kWh/yr]	11113.2	11114.2	11062.4	11085.7	11083.2	11114.7	11113.2	11063.3	11086.6	11085.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,509.2	$ 1,509.34	$ 1,502.01	$ 1,505.31	$ 1,504.96	$ 1,509.42	$ 1,509.2	$ 1,502.14	$ 1,505.44	$ 1,505.31
Annual Energy Natural Gas [m3/yr]	382.7	350.4	382.7	382.7	382.7	329.4	382.7	350.4	350.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 165.08	$ 142.09	$ 165.08	$ 151.15	$ 151.15	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43897	43898	45841	50989	47569	43899	44545	45842	50990	51277
Upgrade Package List	Pkg3321203034	Pkg3321203034	Pkg3321203034	Pkg4321302033	Pkg3341202034	Pkg3321203034	Pkg3321303034	Pkg3321203034	Pkg4321302033	Pkg4321402033
GHGI [kg/m2]	3.65	3.38	3.65	3.65	3.65	3.21	3.65	3.38	3.38	3.65
% ICC	3.4%	3.5%	3.4%	3.5%	3.5%	3.6%	3.5%	3.6%	3.6%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.9	28.9	28.3	29	28.7	28.9	28.9	28.3	29	29
Output: MEUI [kWh/(m2 * yr)]	33.6	32.1	33.4	33.5	33.4	31.2	33.6	31.9	32	33.5
Output: Better than ERS (%)	4970.0%	5080.0%	4990.0%	4980.0%	4980.0%	5150.0%	4970.0%	5100.0%	5090.0%	4980.0%
Output: Better than Envelope (%)	4340.0%	4340.0%	4450.0%	4340.0%	4390.0%	4340.0%	4340.0%	4450.0%	4320.0%	4340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2969	2970	2918	2942	2939	2970	2969	2919	2942	2942
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 418.63	$ 418.77	$ 411.47	$ 414.75	$ 414.4	$ 418.84	$ 418.63	$ 411.59	$ 414.88	$ 414.75
Annual savings in carbon tax for electricity [$/year]	$ 1.48	$ 1.48	$ 1.46	$ 1.47	$ 1.47	$ 1.49	$ 1.48	$ 1.46	$ 1.47	$ 1.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 420.11	$ 420.25	$ 412.93	$ 416.22	$ 415.87	$ 420.33	$ 420.11	$ 413.05	$ 416.35	$ 416.22
Annual savings in GHG from electricity savings [kg CO2e/year]	32.7	32.7	32.1	32.4	32.3	32.7	32.7	32.1	32.4	32.4
Annual savings in natural gas [m3/year]	85.01	86.21	85.01	85.01	85.01	86.99	85.01	86.21	86.21	85.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 787.58	$ 798.73	$ 787.58	$ 787.58	$ 787.58	$ 805.98	$ 787.58	$ 798.73	$ 798.73	$ 787.58
Annual savings in carbon tax for natural gas [$/year]	$ 196.58	$ 199.36	$ 196.58	$ 196.58	$ 196.58	$ 201.17	$ 196.58	$ 199.36	$ 199.36	$ 196.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 984.16	$ 998.09	$ 984.16	$ 984.16	$ 984.16	$ 1,007.15	$ 984.16	$ 998.09	$ 998.09	$ 984.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	4368.4	4430.2	4368.4	4368.4	4368.4	4470.4	4368.4	4430.2	4430.2	4368.4
Net Present Value [$]	$ 6,251.	$ 6,533.01	$ 6,435.2	$ 6,504.83	$ 6,594.7	$ 6,658.37	$ 6,712.06	$ 6,716.84	$ 6,786.65	$ 6,801.23
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	10.51	10.51	14.09	14.09	14.09	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 1,286.55	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 850.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.

MEDIUM Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt VentSystem=>HRV sre 85 Opt HeatingCooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 21,935.31	$ 22,256.77	$ 22,231.71	$ 22,271.7	$ 22,571.7	$ 22,553.17	$ 22,568.1	$ 22,677.7	$ 17,717.76	$ 22,868.1
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 24,699.16	$ 25,061.12	$ 25,032.91	$ 25,077.93	$ 25,415.73	$ 25,394.87	$ 25,411.68	$ 25,535.09	$ 19,950.2	$ 25,749.48
Net Present Value [$]	$ 5,546.18	$ 5,834.76	$ 5,842.58	$ 5,908.57	$ 6,033.62	$ 6,131.16	$ 6,204.97	$ 6,207.03	$ 6,251.	$ 6,330.02
Incremental dollars per GHG saving	$ 6.3	$ 6.38	$ 6.38	$ 6.41	$ 6.42	$ 6.46	$ 6.49	$ 6.48	$ 4.09	$ 6.5
Auxiliary Energy Required Heating [GJ/yr]	18.5	18.4	18.5	17.9	17.9	18.4	17.9	18.2	24.4	17.9
Annual Energy DHW [GJ/yr]	12.3	12.3	12.3	13	12.3	12.3	13	12.3	14.3	12.3
Annual Energy Space Heating [GJ/yr]	19.6	19.5	19.6	19	19	19.5	19	19.3	10.3	19
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	59.2	59.1	59.2	59.4	58.6	59.1	59.4	58.9	54.3	58.6
Design Heating Load [W]	5528.4	5539.7	5528.4	5475.5	5475.5	5539.7	5475.5	5483.6	6559	5475.5
Annual Energy Electricity [kWh/yr]	7689.6	7688.9	7689.6	7686.4	7686.4	7688.9	7686.4	7687.9	11113.2	7686.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,024.76	$ 1,024.66	$ 1,024.76	$ 1,024.31	$ 1,024.31	$ 1,024.66	$ 1,024.31	$ 1,024.52	$ 1,509.2	$ 1,024.31
Annual Energy Natural Gas [m3/yr]	847.3	843.6	847.3	851.4	830.5	843.6	851.4	838.1	382.7	830.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 365.5	$ 363.9	$ 365.5	$ 367.26	$ 358.25	$ 363.9	$ 367.26	$ 361.53	$ 165.08	$ 358.25
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51648	51216	51936	51791	51792	51504	52079	52224	43897	52080
Upgrade Package List	Pkg4331302054	Pkg4321303054	Pkg4331402054	Pkg4331303054	Pkg4331303054	Pkg4321403054	Pkg4331403054	Pkg4341302054	Pkg3321203034	Pkg4331403054
GHGI [kg/m2]	7.28	7.25	7.28	7.32	7.14	7.25	7.32	7.21	3.65	7.14
% ICC	4.2%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	3.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	22	21.8	22	21.3	21.3	21.8	21.3	21.6	28.9	21.3
Output: MEUI [kWh/(m2 * yr)]	39.8	39.7	39.8	40	39.1	39.7	40	39.4	33.6	39.1
Output: Better than ERS (%)	4550.0%	4560.0%	4550.0%	4540.0%	4610.0%	4560.0%	4540.0%	4580.0%	4970.0%	4610.0%
Output: Better than Envelope (%)	5710.0%	5730.0%	5710.0%	5850.0%	5850.0%	5730.0%	5850.0%	5780.0%	4340.0%	5850.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	455	455	455	458	458	455	458	456	2969	458
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 64.1	$ 64.2	$ 64.1	$ 64.55	$ 64.55	$ 64.2	$ 64.55	$ 64.34	$ 418.63	$ 64.55
Annual savings in carbon tax for electricity [$/year]	$ .23	$ .23	$ .23	$ .23	$ .23	$ .23	$ .23	$ .23	$ 1.48	$ .23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 64.33	$ 64.42	$ 64.33	$ 64.78	$ 64.78	$ 64.42	$ 64.78	$ 64.57	$ 420.11	$ 64.78
Annual savings in GHG from electricity savings [kg CO2e/year]	5	5	5	5	5	5	5	5	32.7	5
Annual savings in natural gas [m3/year]	67.7	67.83	67.7	67.54	68.32	67.83	67.54	68.04	85.01	68.32
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 627.2	$ 628.48	$ 627.2	$ 625.79	$ 633.	$ 628.48	$ 625.79	$ 630.38	$ 787.58	$ 633.
Annual savings in carbon tax for natural gas [$/year]	$ 156.55	$ 156.87	$ 156.55	$ 156.19	$ 157.99	$ 156.87	$ 156.19	$ 157.34	$ 196.58	$ 157.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 783.75	$ 785.34	$ 783.75	$ 781.98	$ 790.99	$ 785.34	$ 781.98	$ 787.72	$ 984.16	$ 790.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	3478.8	3485.9	3478.8	3471	3511	3485.9	3471	3496.4	4368.4	3511
Net Present Value [$]	$ 5,546.18	$ 5,834.76	$ 5,842.58	$ 5,908.57	$ 6,033.62	$ 6,131.16	$ 6,204.97	$ 6,207.03	$ 6,251.	$ 6,330.02
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	14.09	14.09	14.09	14.09	10.51	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 1,238.76	$ 6,616.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 1,286.55	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 2,214.76	$ 1,918.36	$ 1,457.3	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 3,150.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$.	$ 850.

MEDIUM Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,309.63	$ 6,409.63	$ 6,530.37	$ 6,624.56	$ 6,630.37	$ 6,650.25	$ 6,724.56	$ 6,744.44	$ 6,845.3	$ 6,859.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,477.06	$ 9,627.26	$ 9,808.62	$ 9,950.09	$ 9,958.82	$ 9,988.68	$ 10,100.29	$ 10,130.15	$ 10,281.64	$ 10,303.16
Net Present Value [$]	$ 5,963.06	$ 6,320.89	$ 5,901.77	$ 5,822.81	$ 6,261.48	$ 4,844.99	$ 6,177.78	$ 4,768.45	$ 5,760.61	$ 5,794.99
Incremental dollars per GHG saving	$ 2.62	$ 2.52	$ 2.67	$ 2.71	$ 2.58	$ 2.97	$ 2.61	$ 3.	$ 2.76	$ 2.75
Auxiliary Energy Required Heating [GJ/yr]	54.6	62.5	54	53.9	61.9	57.8	61.8	57.7	53.3	54.6
Annual Energy DHW [GJ/yr]	26.5	15.8	26.5	26.5	15.8	26.5	15.8	26.5	26.5	24.8
Annual Energy Space Heating [GJ/yr]	57.9	66.2	57.2	57.1	65.5	61.2	65.5	61.1	56.5	57.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	110.8	108.4	110.1	110	107.7	114.1	107.7	114	109.4	109.1
Design Heating Load [W]	11221.4	12074.9	11114.7	11146.2	11968.1	11114.7	11999.7	11146.2	11039.5	11221.4
Annual Energy Electricity [kWh/yr]	7619.1	7660.9	7615.7	7615.4	7657.4	7635.7	7657.2	7635.4	7612	7619.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,014.79	$ 1,020.7	$ 1,014.31	$ 1,014.26	$ 1,020.21	$ 1,017.14	$ 1,020.18	$ 1,017.09	$ 1,013.78	$ 1,014.79
Annual Energy Natural Gas [m3/yr]	2238.2	2170.7	2220.2	2218.5	2152.5	2325.9	2151.3	2323.9	2200.6	2192.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 965.48	$ 936.36	$ 957.72	$ 956.98	$ 928.51	$ 1,003.31	$ 928.	$ 1,002.45	$ 949.26	$ 945.81
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64153	54436	64423	65773	54706	64369	56056	65719	66043	64154
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg2131101031	Pkg1121102031	Pkg2121102021	Pkg1131101031	Pkg2131101021	Pkg2131102031	Pkg2121101031
GHGI [kg/m2]	18.64	18.09	18.49	18.48	17.94	19.36	17.93	19.34	18.33	18.27
% ICC	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.7	74.1	64	63.9	73.3	68.5	73.3	68.4	63.2	64.7
Output: MEUI [kWh/(m2 * yr)]	100.9	98.1	100.1	100	97.3	104.9	97.2	104.8	99.2	98.9
Output: Better than ERS (%)	2230.0%	2040.0%	2280.0%	2290.0%	2090.0%	2000.0%	2090.0%	2010.0%	2330.0%	2350.0%
Output: Better than Envelope (%)	1910.0%	740.0%	2000.0%	2010.0%	830.0%	1440.0%	840.0%	1450.0%	2100.0%	1910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	684	642	687	687	645	667	645	667	691	684
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 96.37	$ 90.48	$ 96.85	$ 96.9	$ 90.97	$ 94.03	$ 91.	$ 94.08	$ 97.37	$ 96.37
Annual savings in carbon tax for electricity [$/year]	$ .34	$ .32	$ .34	$ .34	$ .32	$ .33	$ .32	$ .33	$ .35	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 96.72	$ 90.8	$ 97.2	$ 97.24	$ 91.3	$ 94.37	$ 91.32	$ 94.41	$ 97.72	$ 96.72
Annual savings in GHG from electricity savings [kg CO2e/year]	7.5	7.1	7.6	7.6	7.1	7.3	7.1	7.3	7.6	7.5
Annual savings in natural gas [m3/year]	46.76	49.28	47.43	47.5	49.96	43.5	50	43.57	48.16	48.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 433.27	$ 456.57	$ 439.48	$ 440.07	$ 462.85	$ 402.99	$ 463.26	$ 403.68	$ 446.25	$ 449.01
Annual savings in carbon tax for natural gas [$/year]	$ 108.14	$ 113.96	$ 109.69	$ 109.84	$ 115.53	$ 100.58	$ 115.63	$ 100.76	$ 111.38	$ 112.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 541.41	$ 570.52	$ 549.17	$ 549.9	$ 578.37	$ 503.58	$ 578.89	$ 504.44	$ 557.63	$ 561.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	2403.1	2532.4	2437.6	2440.9	2567.2	2235.2	2569.5	2239	2475.1	2490.4
Net Present Value [$]	$ 5,963.06	$ 6,320.89	$ 5,901.77	$ 5,822.81	$ 6,261.48	$ 4,844.99	$ 6,177.78	$ 4,768.45	$ 5,760.61	$ 5,794.99
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,358.64	$ 1,238.76	$ 1,358.64	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 8,820.87	$ 9,041.61	$ 8,220.87	$ 10,333.63	$ 9,135.8	$ 9,370.87	$ 10,554.37	$ 8,441.61	$ 9,356.54	$ 10,648.56
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,248.95	$ 13,580.5	$ 12,347.75	$ 15,521.11	$ 13,721.97	$ 14,075.05	$ 15,852.66	$ 12,679.3	$ 14,053.52	$ 15,994.14
Net Present Value [$]	$ 4,871.67	$ 4,927.54	$ 6,552.69	$ 10,247.29	$ 4,964.4	$ 5,100.79	$ 10,290.56	$ 6,595.41	$ 5,018.07	$ 10,348.05
Incremental dollars per GHG saving	$ 1.53	$ 1.56	$ 1.57	$ 1.57	$ 1.58	$ 1.6	$ 1.61	$ 1.61	$ 1.62	$ 1.62
Auxiliary Energy Required Heating [GJ/yr]	67.7	67	66.2	67.9	67	67.7	67.3	65.6	66.3	67.3
Annual Energy DHW [GJ/yr]	15.8	15.8	26.6	9.1	15.8	14.3	9.1	26.6	15.8	9.1
Annual Energy Space Heating [GJ/yr]	33.4	33.1	33	34.2	33	33.4	34	32.8	32.8	33.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	76.1	75.9	86.7	70.7	75.8	74.7	70.4	86.4	75.6	70.4
Design Heating Load [W]	11614.8	11508	12019.2	12582.7	11539.6	11614.8	12475.9	11912.4	11432.8	12507.5
Annual Energy Electricity [kWh/yr]	16755.2	16691.2	16700.6	19634.9	16668.9	16756.8	19565.9	16631.5	16604	19551.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,307.55	$ 2,298.49	$ 2,299.82	$ 2,715.02	$ 2,295.33	$ 2,307.77	$ 2,705.26	$ 2,290.04	$ 2,286.15	$ 2,703.25
Annual Energy Natural Gas [m3/yr]	423.9	423.9	713	0	423.9	385.1	0	713	423.9	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 307.56	$.	$ 182.86	$ 166.12	$.	$ 307.56	$ 182.86	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64057	64327	64054	54448	65677	64058	54718	64324	65947	56068
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2121101011	Pkg1121101031	Pkg2131101011	Pkg2121101011	Pkg1121102031	Pkg2121102011	Pkg2131102011	Pkg1131101031
GHGI [kg/m2]	4.25	4.25	6.61	0.92	4.24	3.93	0.92	6.6	4.24	0.92
% ICC	1.7%	1.7%	1.6%	2.0%	1.7%	1.8%	2.0%	1.6%	1.8%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	80.2	79.4	78.5	80.5	79.4	80.3	79.7	77.7	78.6	79.7
Output: MEUI [kWh/(m2 * yr)]	59.8	59.5	72.3	53.3	59.4	58	53	72	59.1	52.9
Output: Better than ERS (%)	4280.0%	4290.0%	3780.0%	4720.0%	4300.0%	4380.0%	4750.0%	3810.0%	4320.0%	4750.0%
Output: Better than Envelope (%)	30.0%	70.0%	190.0%	60.0%	70.0%	30.0%	30.0%	280.0%	180.0%	30.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8453	8389	8398	11332	8366	8454	11263	8329	8301	11249
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,191.82	$ 1,182.79	$ 1,184.12	$ 1,597.85	$ 1,179.65	$ 1,192.04	$ 1,588.13	$ 1,174.37	$ 1,170.5	$ 1,586.12
Annual savings in carbon tax for electricity [$/year]	$ 4.23	$ 4.19	$ 4.2	$ 5.67	$ 4.18	$ 4.23	$ 5.63	$ 4.16	$ 4.15	$ 5.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,196.04	$ 1,186.99	$ 1,188.32	$ 1,603.52	$ 1,183.83	$ 1,196.27	$ 1,593.76	$ 1,178.54	$ 1,174.65	$ 1,591.75
Annual savings in GHG from electricity savings [kg CO2e/year]	93	92.3	92.4	124.7	92	93	123.9	91.6	91.3	123.7
Annual savings in natural gas [m3/year]	114.36	114.36	103.59	130.16	114.36	115.81	130.16	103.59	114.36	130.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,059.57	$ 1,059.57	$ 959.77	$ 1,205.9	$ 1,059.57	$ 1,072.96	$ 1,205.9	$ 959.77	$ 1,059.57	$ 1,205.9
Annual savings in carbon tax for natural gas [$/year]	$ 264.46	$ 264.46	$ 239.55	$ 300.99	$ 264.46	$ 267.81	$ 300.99	$ 239.55	$ 264.46	$ 300.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,324.03	$ 1,324.03	$ 1,199.32	$ 1,506.89	$ 1,324.03	$ 1,340.77	$ 1,506.89	$ 1,199.32	$ 1,324.03	$ 1,506.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	5877	5877	5323.4	6688.6	5877	5951.3	6688.6	5323.4	5877	6688.6
Net Present Value [$]	$ 4,871.67	$ 4,927.54	$ 6,552.69	$ 10,247.29	$ 4,964.4	$ 5,100.79	$ 10,290.56	$ 6,595.41	$ 5,018.07	$ 10,348.05
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$.	$ 1,238.76	$.	$.	$ 1,238.76	$.	$.	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.

MEDIUM Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,909.63	$ 7,130.37	$ 7,224.56	$ 7,445.3	$ 7,459.63	$ 8,436.03	$ 7,680.37	$ 8,656.77	$ 7,759.63	$ 7,774.56
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,378.26	$ 10,709.82	$ 10,851.29	$ 11,182.84	$ 11,204.36	$ 12,670.92	$ 11,535.92	$ 13,002.47	$ 11,654.96	$ 11,677.39
Net Present Value [$]	$ 7,483.74	$ 7,423.6	$ 7,339.9	$ 7,279.58	$ 7,255.24	$ 7,248.63	$ 7,195.71	$ 7,187.58	$ 7,168.65	$ 7,112.02
Incremental dollars per GHG saving	$ 2.38	$ 2.43	$ 2.46	$ 2.51	$ 2.51	$ 2.65	$ 2.55	$ 2.69	$ 2.57	$ 2.58
Auxiliary Energy Required Heating [GJ/yr]	55.8	55.2	55.1	54.5	55.8	50.6	55.2	50	55.8	55.1
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	15.8	14.3	15.8	13.4	14.3
Annual Energy Space Heating [GJ/yr]	59.1	58.4	58.4	57.7	59.1	53.6	58.5	52.9	59.1	58.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	101.3	100.6	100.6	99.9	99.9	95.8	99.2	95.1	98.9	99.1
Design Heating Load [W]	10818.5	10711.7	10743.3	10636.5	10818.5	10206.2	10711.7	10099.5	10818.5	10743.3
Annual Energy Electricity [kWh/yr]	7625.4	7621.9	7621.7	7618.3	7625.4	7597.8	7622	7594.4	7625.5	7621.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,015.68	$ 1,015.18	$ 1,015.16	$ 1,014.67	$ 1,015.68	$ 1,011.77	$ 1,015.2	$ 1,011.29	$ 1,015.69	$ 1,015.17
Annual Energy Natural Gas [m3/yr]	1983.1	1965	1963.8	1945.7	1944.7	1837.4	1926.5	1819.4	1919.2	1925.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 855.44	$ 847.63	$ 847.11	$ 839.31	$ 838.88	$ 792.59	$ 831.02	$ 784.83	$ 827.88	$ 830.51
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64156	64426	65776	66046	64157	70528	64427	70798	64158	65777
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2221102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	16.56	16.41	16.4	16.25	16.24	15.37	16.09	15.22	16.03	16.08
% ICC	1.3%	1.4%	1.4%	1.4%	1.4%	1.6%	1.5%	1.7%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	66.2	65.4	65.3	64.6	66.2	60	65.4	59.2	66.2	65.3
Output: MEUI [kWh/(m2 * yr)]	89.7	88.9	88.8	88	88	83.1	87.2	82.3	86.9	87.1
Output: Better than ERS (%)	2560.0%	2610.0%	2610.0%	2670.0%	2670.0%	2970.0%	2720.0%	3020.0%	2740.0%	2720.0%
Output: Better than Envelope (%)	1730.0%	1820.0%	1840.0%	1930.0%	1730.0%	2500.0%	1820.0%	2590.0%	1730.0%	1840.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	677	681	681	684	677	705	681	708	677	681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 95.49	$ 95.98	$ 96.01	$ 96.49	$ 95.49	$ 99.38	$ 95.96	$ 99.86	$ 95.47	$ 95.99
Annual savings in carbon tax for electricity [$/year]	$ .34	$ .34	$ .34	$ .34	$ .34	$ .35	$ .34	$ .35	$ .34	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 95.82	$ 96.32	$ 96.35	$ 96.83	$ 95.82	$ 99.73	$ 96.3	$ 100.21	$ 95.81	$ 96.33
Annual savings in GHG from electricity savings [kg CO2e/year]	7.4	7.5	7.5	7.5	7.4	7.8	7.5	7.8	7.4	7.5
Annual savings in natural gas [m3/year]	56.27	56.94	56.99	57.66	57.7	61.7	58.38	62.37	58.65	58.42
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 521.33	$ 527.58	$ 527.99	$ 534.24	$ 534.58	$ 571.62	$ 540.87	$ 577.84	$ 543.39	$ 541.28
Annual savings in carbon tax for natural gas [$/year]	$ 130.12	$ 131.68	$ 131.78	$ 133.34	$ 133.43	$ 142.67	$ 135.	$ 144.23	$ 135.63	$ 135.1
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 651.45	$ 659.26	$ 659.77	$ 667.58	$ 668.01	$ 714.3	$ 675.86	$ 722.06	$ 679.01	$ 676.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	2891.6	2926.2	2928.5	2963.2	2965.1	3170.5	2999.9	3205	3013.9	3002.2
Net Present Value [$]	$ 7,483.74	$ 7,423.6	$ 7,339.9	$ 7,279.58	$ 7,255.24	$ 7,248.63	$ 7,195.71	$ 7,187.58	$ 7,168.65	$ 7,112.02
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	5.28	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 4,812.4	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,680.37	$ 9,774.56	$ 9,995.3	$ 10,230.37	$ 10,324.56	$ 10,530.37	$ 10,545.3	$ 10,624.56	$ 10,819.63	$ 10,845.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 14,539.92	$ 14,681.39	$ 15,012.94	$ 15,366.02	$ 15,507.49	$ 15,816.62	$ 15,839.04	$ 15,958.09	$ 16,251.08	$ 16,289.64
Net Present Value [$]	$ 4,549.96	$ 4,611.17	$ 4,648.78	$ 4,718.03	$ 4,779.98	$ 4,765.92	$ 4,817.58	$ 4,827.14	$ 6,036.91	$ 4,865.48
Incremental dollars per GHG saving	$ 1.85	$ 1.86	$ 1.91	$ 1.92	$ 1.94	$ 1.95	$ 1.98	$ 1.97	$ 2.06	$ 2.01
Auxiliary Energy Required Heating [GJ/yr]	53.8	53.8	53.2	53.8	53.8	53.8	53.2	53.8	52.7	53.2
Annual Energy DHW [GJ/yr]	26.5	26.5	26.5	24.8	24.8	23.7	24.8	23.7	26.6	23.7
Annual Energy Space Heating [GJ/yr]	27.8	27.8	27.5	27.8	27.8	27.8	27.5	27.8	27.3	27.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7	0.8
Total Energy [GJ/yr]	81.8	81.8	81.5	80.1	80.1	79	79.8	79	82.3	78.7
Design Heating Load [W]	11209.5	11241.1	11134.3	11209.5	11241.1	11209.5	11134.3	11241.1	10492.2	11134.3
Annual Energy Electricity [kWh/yr]	15356.4	15345.2	15274.1	15356.4	15345.2	15356.4	15274.1	15345.2	15490.8	15274.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,109.62	$ 2,108.03	$ 2,097.97	$ 2,109.62	$ 2,108.03	$ 2,109.62	$ 2,097.97	$ 2,108.03	$ 2,128.63	$ 2,097.97
Annual Energy Natural Gas [m3/yr]	712.8	712.3	712.3	667.2	666.8	637.1	666.8	636.6	713	636.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.48	$ 307.26	$ 307.26	$ 287.81	$ 287.63	$ 274.82	$ 287.63	$ 274.61	$ 307.56	$ 274.65
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64432	65782	66052	64433	65783	64434	66053	65784	64180	66054
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2121101032	Pkg2131102031
GHGI [kg/m2]	6.54	6.54	6.54	6.17	6.17	5.92	6.16	5.92	6.55	5.92
% ICC	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	63.8	63.8	63	63.8	63.8	63.8	63	63.8	62.4	63
Output: MEUI [kWh/(m2 * yr)]	66.5	66.4	66.1	64.5	64.4	63.1	64.1	63.1	67	62.8
Output: Better than ERS (%)	4140.0%	4140.0%	4160.0%	4260.0%	4260.0%	4340.0%	4280.0%	4340.0%	4100.0%	4360.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2120.0%	2030.0%	2030.0%	2030.0%	2120.0%	2030.0%	2190.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7054	7043	6972	7054	7043	7054	6972	7043	7188	6972
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 994.59	$ 993.01	$ 982.98	$ 994.59	$ 993.01	$ 994.59	$ 982.98	$ 993.01	$ 1,013.54	$ 982.98
Annual savings in carbon tax for electricity [$/year]	$ 3.53	$ 3.52	$ 3.49	$ 3.53	$ 3.52	$ 3.53	$ 3.49	$ 3.52	$ 3.59	$ 3.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 998.11	$ 996.53	$ 986.47	$ 998.11	$ 996.53	$ 998.11	$ 986.47	$ 996.53	$ 1,017.13	$ 986.47
Annual savings in GHG from electricity savings [kg CO2e/year]	77.6	77.5	76.7	77.6	77.5	77.6	76.7	77.5	79.1	76.7
Annual savings in natural gas [m3/year]	103.6	103.62	103.62	105.3	105.31	106.42	105.31	106.44	103.59	106.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 959.84	$ 960.01	$ 960.01	$ 975.58	$ 975.72	$ 985.97	$ 975.72	$ 986.14	$ 959.77	$ 986.11
Annual savings in carbon tax for natural gas [$/year]	$ 239.57	$ 239.61	$ 239.61	$ 243.5	$ 243.53	$ 246.09	$ 243.53	$ 246.14	$ 239.55	$ 246.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,199.41	$ 1,199.63	$ 1,199.63	$ 1,219.08	$ 1,219.25	$ 1,232.07	$ 1,219.25	$ 1,232.28	$ 1,199.32	$ 1,232.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	5323.8	5324.8	5324.8	5411.1	5411.9	5468.8	5411.9	5469.7	5323.4	5469.5
Net Present Value [$]	$ 4,549.96	$ 4,611.17	$ 4,648.78	$ 4,718.03	$ 4,779.98	$ 4,765.92	$ 4,817.58	$ 4,827.14	$ 6,036.91	$ 4,865.48
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.

MEDIUM Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 9,680.37	$ 9,774.56	$ 9,995.3	$ 10,230.37	$ 10,324.56	$ 10,530.37	$ 11,419.63	$ 10,624.56	$ 10,545.3	$ 11,586.03
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 14,539.92	$ 14,681.39	$ 15,012.94	$ 15,366.02	$ 15,507.49	$ 15,816.62	$ 17,152.28	$ 15,958.09	$ 15,839.04	$ 17,402.22
Net Present Value [$]	$ 4,549.96	$ 4,611.17	$ 4,648.78	$ 4,718.03	$ 4,779.98	$ 4,765.92	$ 4,342.39	$ 4,827.14	$ 4,817.58	$ 2,649.34
Incremental dollars per GHG saving	$ 1.85	$ 1.86	$ 1.91	$ 1.92	$ 1.94	$ 1.95	$ 1.97	$ 1.97	$ 1.98	$ 2.
Auxiliary Energy Required Heating [GJ/yr]	53.8	53.8	53.2	53.8	53.8	53.8	53.8	53.8	53.2	50.4
Annual Energy DHW [GJ/yr]	26.5	26.5	26.5	24.8	24.8	23.7	15.8	23.7	24.8	15.8
Annual Energy Space Heating [GJ/yr]	27.8	27.8	27.5	27.8	27.8	27.8	27.5	27.8	27.5	25.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	1.7	0.8	0.8	0.8
Total Energy [GJ/yr]	81.8	81.8	81.5	80.1	80.1	79	71.7	79	79.8	69.1
Design Heating Load [W]	11209.5	11241.1	11134.3	11209.5	11241.1	11209.5	10087.8	11241.1	11134.3	10299.7
Annual Energy Electricity [kWh/yr]	15356.4	15345.2	15274.1	15356.4	15345.2	15356.4	15540.2	15345.2	15274.1	14817.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,109.62	$ 2,108.03	$ 2,097.97	$ 2,109.62	$ 2,108.03	$ 2,109.62	$ 2,135.62	$ 2,108.03	$ 2,097.97	$ 2,033.42
Annual Energy Natural Gas [m3/yr]	712.8	712.3	712.3	667.2	666.8	637.1	423.9	636.6	666.8	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.48	$ 307.26	$ 307.26	$ 287.81	$ 287.63	$ 274.82	$ 182.86	$ 274.61	$ 287.63	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64432	65782	66052	64433	65783	64434	64183	65784	66053	70537
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2121101032	Pkg2131101031	Pkg2131102031	Pkg2221101031
GHGI [kg/m2]	6.54	6.54	6.54	6.17	6.17	5.92	4.19	5.92	6.16	4.16
% ICC	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.2%	2.0%	2.0%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	63.8	63.8	63	63.8	63.8	63.8	63.8	63.8	63	59.8
Output: MEUI [kWh/(m2 * yr)]	66.5	66.4	66.1	64.5	64.4	63.1	54.5	63.1	64.1	51.4
Output: Better than ERS (%)	4140.0%	4140.0%	4160.0%	4260.0%	4260.0%	4340.0%	4610.0%	4340.0%	4280.0%	4800.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2120.0%	2030.0%	2030.0%	2030.0%	2030.0%	2030.0%	2120.0%	2530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7054	7043	6972	7054	7043	7054	7238	7043	6972	6515
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 994.59	$ 993.01	$ 982.98	$ 994.59	$ 993.01	$ 994.59	$ 1,020.5	$ 993.01	$ 982.98	$ 918.66
Annual savings in carbon tax for electricity [$/year]	$ 3.53	$ 3.52	$ 3.49	$ 3.53	$ 3.52	$ 3.53	$ 3.62	$ 3.52	$ 3.49	$ 3.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 998.11	$ 996.53	$ 986.47	$ 998.11	$ 996.53	$ 998.11	$ 1,024.12	$ 996.53	$ 986.47	$ 921.91
Annual savings in GHG from electricity savings [kg CO2e/year]	77.6	77.5	76.7	77.6	77.5	77.6	79.6	77.5	76.7	71.7
Annual savings in natural gas [m3/year]	103.6	103.62	103.62	105.3	105.31	106.42	114.36	106.44	105.31	114.36
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 959.84	$ 960.01	$ 960.01	$ 975.58	$ 975.72	$ 985.97	$ 1,059.57	$ 986.14	$ 975.72	$ 1,059.57
Annual savings in carbon tax for natural gas [$/year]	$ 239.57	$ 239.61	$ 239.61	$ 243.5	$ 243.53	$ 246.09	$ 264.46	$ 246.14	$ 243.53	$ 264.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,199.41	$ 1,199.63	$ 1,199.63	$ 1,219.08	$ 1,219.25	$ 1,232.07	$ 1,324.03	$ 1,232.28	$ 1,219.25	$ 1,324.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	5323.8	5324.8	5324.8	5411.1	5411.9	5468.8	5877	5469.7	5411.9	5877
Net Present Value [$]	$ 4,549.96	$ 4,611.17	$ 4,648.78	$ 4,718.03	$ 4,779.98	$ 4,765.92	$ 4,342.39	$ 4,827.14	$ 4,817.58	$ 2,649.34
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$ 550.	$.

MEDIUM Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,431.08	$ 13,525.27	$ 13,710.34	$ 13,746.01	$ 13,760.34	$ 13,931.08	$ 13,981.08	$ 14,060.34	$ 14,025.27	$ 14,281.08
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,173.48	$ 20,314.96	$ 20,592.93	$ 20,646.51	$ 20,668.03	$ 20,924.48	$ 20,999.58	$ 21,118.63	$ 21,065.96	$ 21,450.18
Net Present Value [$]	$ 4,390.86	$ 4,301.22	$ 4,248.18	$ 4,237.5	$ 4,226.33	$ 4,184.46	$ 4,163.34	$ 4,139.86	$ 4,092.69	$ 4,076.74
Incremental dollars per GHG saving	$ 3.55	$ 3.57	$ 3.6	$ 3.6	$ 3.6	$ 3.62	$ 3.63	$ 3.63	$ 3.65	$ 3.66
Auxiliary Energy Required Heating [GJ/yr]	39.3	39.2	38.7	38.6	39.9	38.1	39.3	39.9	38.1	39.3
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	15.8	14.3	13.4	15.8	13.4
Annual Energy Space Heating [GJ/yr]	41.6	41.6	41	40.9	42.3	40.3	41.6	42.3	40.3	41.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	84.7	84.1	84	83.9	83.4	83.4	83.3	83	83.4	82.3
Design Heating Load [W]	8019.7	8051.3	8081.5	7944.5	8126.5	7974.8	8019.7	8126.5	8006.3	8019.7
Annual Energy Electricity [kWh/yr]	7799	7798.9	7796.1	7795.5	7802.4	7792.7	7799	7802.4	7792.7	7799.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,040.24	$ 1,040.23	$ 1,039.83	$ 1,039.75	$ 1,040.72	$ 1,039.35	$ 1,040.24	$ 1,040.72	$ 1,039.35	$ 1,040.26
Annual Energy Natural Gas [m3/yr]	1520.4	1519.9	1505	1502.2	1499.7	1487.3	1481.9	1474.2	1487	1456.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 655.85	$ 655.63	$ 649.2	$ 648.	$ 646.92	$ 641.57	$ 639.24	$ 635.92	$ 641.44	$ 628.24
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96358	98086	96160	98302	96143	96376	96359	96144	98104	96360
Upgrade Package List	Pkg3321202033	Pkg3331201033	Pkg3321201034	Pkg3331202033	Pkg3321201033	Pkg3321202034	Pkg3321202033	Pkg3321201033	Pkg3331201034	Pkg3321202033
GHGI [kg/m2]	12.79	12.78	12.66	12.64	12.62	12.51	12.47	12.41	12.51	12.26
% ICC	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	46.5	46.5	45.9	45.7	47.3	45.1	46.5	47.3	45.1	46.5
Output: MEUI [kWh/(m2 * yr)]	70	70	69.3	69.2	69.1	68.5	68.3	68	68.5	67.2
Output: Better than ERS (%)	3780.0%	3780.0%	3830.0%	3830.0%	3840.0%	3880.0%	3880.0%	3910.0%	3880.0%	3960.0%
Output: Better than Envelope (%)	4180.0%	4190.0%	4270.0%	4280.0%	4090.0%	4360.0%	4180.0%	4090.0%	4360.0%	4180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	504	504	506	507	500	510	504	500	510	504
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 71.01	$ 71.02	$ 71.42	$ 71.5	$ 70.53	$ 71.9	$ 71.01	$ 70.53	$ 71.9	$ 70.99
Annual savings in carbon tax for electricity [$/year]	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25	$ .25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 71.26	$ 71.27	$ 71.67	$ 71.75	$ 70.78	$ 72.15	$ 71.26	$ 70.78	$ 72.15	$ 71.25
Annual savings in GHG from electricity savings [kg CO2e/year]	5.5	5.5	5.6	5.6	5.5	5.6	5.5	5.5	5.6	5.5
Annual savings in natural gas [m3/year]	73.51	73.53	74.08	74.19	74.28	74.74	74.94	75.23	74.75	75.89
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 681.05	$ 681.23	$ 686.37	$ 687.34	$ 688.2	$ 692.48	$ 694.34	$ 697.	$ 692.58	$ 703.15
Annual savings in carbon tax for natural gas [$/year]	$ 169.99	$ 170.03	$ 171.31	$ 171.56	$ 171.77	$ 172.84	$ 173.3	$ 173.97	$ 172.87	$ 175.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 851.04	$ 851.26	$ 857.68	$ 858.89	$ 859.97	$ 865.32	$ 867.65	$ 870.97	$ 865.45	$ 878.65
Annual savings in GHG from natural gas savings [kg CO2e/year]	3777.5	3778.5	3807	3812.3	3817.1	3840.9	3851.2	3866	3841.5	3900
Net Present Value [$]	$ 4,390.86	$ 4,301.22	$ 4,248.18	$ 4,237.5	$ 4,226.33	$ 4,184.46	$ 4,163.34	$ 4,139.86	$ 4,092.69	$ 4,076.74
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.

MEDIUM Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,760.34	$ 15,981.08	$ 16,075.27	$ 16,221.22	$ 16,260.34	$ 16,296.01	$ 16,310.34	$ 16,415.16	$ 16,424.36	$ 16,441.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,672.03	$ 24,003.58	$ 24,145.06	$ 24,364.27	$ 24,423.03	$ 24,476.61	$ 24,498.13	$ 24,655.57	$ 24,669.39	$ 24,695.82
Net Present Value [$]	$ 6,167.28	$ 6,215.47	$ 6,275.54	$ 6,628.16	$ 6,357.67	$ 6,324.16	$ 6,336.08	$ 7,058.86	$ 6,793.27	$ 6,676.35
Incremental dollars per GHG saving	$ 2.99	$ 3.04	$ 3.05	$ 3.08	$ 3.09	$ 3.1	$ 3.05	$ 3.12	$ 3.12	$ 3.12
Auxiliary Energy Required Heating [GJ/yr]	38.7	38	38	38.7	37.5	37.4	38.7	38.9	38.7	38
Annual Energy DHW [GJ/yr]	26.6	26.6	26.6	26.6	26.6	26.6	24.9	26.6	26.6	26.6
Annual Energy Space Heating [GJ/yr]	20.6	20.3	20.3	20.6	20.1	20	20.6	20.9	20.5	20.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	75.6	75.4	75.3	75.6	75.2	75.1	73.9	75.9	75.6	75.4
Design Heating Load [W]	8604.7	8497.9	8529.5	8604.7	8559.8	8422.7	8604.7	8735.8	8377.8	8497.9
Annual Energy Electricity [kWh/yr]	13619.7	13552.4	13541.1	13619.7	13498.5	13473.9	13619.7	13712.3	13605.6	13552.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,863.87	$ 1,854.35	$ 1,852.75	$ 1,863.87	$ 1,846.72	$ 1,843.24	$ 1,863.87	$ 1,876.98	$ 1,861.88	$ 1,854.35
Annual Energy Natural Gas [m3/yr]	713.8	713.9	713.3	713.8	714.1	713.4	668.3	713.6	713.6	713.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.91	$ 307.95	$ 307.69	$ 307.91	$ 308.04	$ 307.74	$ 288.28	$ 307.82	$ 307.82	$ 307.95
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	96148	96364	98092	96796	96166	98308	96149	90766	101962	97012
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3331201033	Pkg3321301033	Pkg3321201034	Pkg3331202033	Pkg3321201033	Pkg3231203034	Pkg4221302033	Pkg3321302033
GHGI [kg/m2]	6.47	6.47	6.46	6.47	6.47	6.46	6.1	6.47	6.47	6.47
% ICC	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	45.8	45.1	45.1	45.8	44.5	44.3	45.8	46.1	45.9	45.1
Output: MEUI [kWh/(m2 * yr)]	59.1	58.8	58.7	59.1	58.6	58.5	57.1	59.5	59	58.8
Output: Better than ERS (%)	4580.0%	4590.0%	4600.0%	4580.0%	4610.0%	4620.0%	4700.0%	4560.0%	4580.0%	4590.0%
Output: Better than Envelope (%)	4270.0%	4370.0%	4370.0%	4270.0%	4440.0%	4460.0%	4270.0%	4240.0%	4270.0%	4370.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5317	5250	5238	5317	5196	5171	5317	5410	5303	5250
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 749.71	$ 740.22	$ 738.63	$ 749.71	$ 732.62	$ 729.15	$ 749.71	$ 762.77	$ 747.72	$ 740.22
Annual savings in carbon tax for electricity [$/year]	$ 2.66	$ 2.62	$ 2.62	$ 2.66	$ 2.6	$ 2.59	$ 2.66	$ 2.7	$ 2.65	$ 2.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 752.37	$ 742.85	$ 741.25	$ 752.37	$ 735.22	$ 731.74	$ 752.37	$ 765.47	$ 750.37	$ 742.85
Annual savings in GHG from electricity savings [kg CO2e/year]	58.5	57.7	57.6	58.5	57.2	56.9	58.5	59.5	58.3	57.7
Annual savings in natural gas [m3/year]	103.56	103.56	103.58	103.56	103.55	103.58	105.26	103.57	103.57	103.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 959.49	$ 959.46	$ 959.67	$ 959.49	$ 959.39	$ 959.63	$ 975.2	$ 959.56	$ 959.56	$ 959.46
Annual savings in carbon tax for natural gas [$/year]	$ 239.49	$ 239.48	$ 239.53	$ 239.49	$ 239.46	$ 239.52	$ 243.41	$ 239.5	$ 239.5	$ 239.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,198.98	$ 1,198.94	$ 1,199.2	$ 1,198.98	$ 1,198.85	$ 1,199.15	$ 1,218.61	$ 1,199.07	$ 1,199.07	$ 1,198.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	5321.9	5321.7	5322.9	5321.9	5321.3	5322.7	5409	5322.3	5322.3	5321.7
Net Present Value [$]	$ 6,167.28	$ 6,215.47	$ 6,275.54	$ 6,628.16	$ 6,357.67	$ 6,324.16	$ 6,336.08	$ 7,058.86	$ 6,793.27	$ 6,676.35
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	14.09	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 4,812.4	$ 4,812.4	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,860.34	$ 16,896.01	$ 17,081.08	$ 17,175.27	$ 17,410.34	$ 17,217.83	$ 17,446.01	$ 17,321.22	$ 17,710.34	$ 17,356.89
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,324.23	$ 25,377.81	$ 25,655.78	$ 25,797.26	$ 26,150.33	$ 25,861.18	$ 26,203.91	$ 26,016.47	$ 26,600.93	$ 26,070.05
Net Present Value [$]	$ 4,642.78	$ 4,615.28	$ 4,685.32	$ 4,749.56	$ 4,871.35	$ 4,915.55	$ 4,844.03	$ 5,103.66	$ 4,958.49	$ 5,076.16
Incremental dollars per GHG saving	$ 2.9	$ 2.9	$ 2.94	$ 2.95	$ 2.95	$ 2.96	$ 2.96	$ 2.98	$ 2.98	$ 2.98
Auxiliary Energy Required Heating [GJ/yr]	38.6	38.5	37.9	37.9	38.6	38.3	38.5	38.6	38.6	38.5
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	15.8	14.3	15.8	13.4	15.8
Annual Energy Space Heating [GJ/yr]	20.3	20.2	20	20	20.3	20.2	20.2	20.3	20.3	20.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	64.5	64.5	64.4	64.3	63.1	64.4	63	64.5	62.1	64.5
Design Heating Load [W]	8171	8033.9	8064.2	8095.7	8171	8046.3	8033.9	8171	8171	8033.9
Annual Energy Electricity [kWh/yr]	13543.5	13519	13474.3	13462.7	13544.9	13510.6	13520.4	13543.5	13545.8	13519
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,853.09	$ 1,849.62	$ 1,843.3	$ 1,841.66	$ 1,853.29	$ 1,848.43	$ 1,849.82	$ 1,853.09	$ 1,853.42	$ 1,849.62
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	423.9	385.1	423.9	359.4	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 166.12	$ 182.86	$ 155.03	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	96169	98311	96385	98113	96170	96583	98312	96817	96171	98959
Upgrade Package List	Pkg3321201034	Pkg3331202033	Pkg3321202034	Pkg3331201034	Pkg3321201034	Pkg3321203033	Pkg3331202033	Pkg3321301034	Pkg3321201034	Pkg3331302033
GHGI [kg/m2]	4.1	4.1	4.09	4.09	3.78	4.1	3.78	4.1	3.57	4.1
% ICC	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	45.7	45.6	44.9	44.9	45.7	45.4	45.6	45.7	45.7	45.6
Output: MEUI [kWh/(m2 * yr)]	46	45.9	45.7	45.6	44.3	45.8	44.2	46	43.1	45.9
Output: Better than ERS (%)	5150.0%	5150.0%	5170.0%	5170.0%	5260.0%	5160.0%	5260.0%	5150.0%	5330.0%	5150.0%
Output: Better than Envelope (%)	4280.0%	4300.0%	4390.0%	4390.0%	4280.0%	4330.0%	4300.0%	4280.0%	4280.0%	4300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5241	5216	5172	5160	5242	5208	5218	5241	5243	5216
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 738.97	$ 735.51	$ 729.21	$ 727.57	$ 739.16	$ 734.33	$ 735.71	$ 738.97	$ 739.29	$ 735.51
Annual savings in carbon tax for electricity [$/year]	$ 2.62	$ 2.61	$ 2.59	$ 2.58	$ 2.62	$ 2.6	$ 2.61	$ 2.62	$ 2.62	$ 2.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 741.59	$ 738.12	$ 731.8	$ 730.15	$ 741.79	$ 736.93	$ 738.32	$ 741.59	$ 741.91	$ 738.12
Annual savings in GHG from electricity savings [kg CO2e/year]	57.6	57.4	56.9	56.8	57.7	57.3	57.4	57.6	57.7	57.4
Annual savings in natural gas [m3/year]	114.36	114.36	114.36	114.36	115.81	114.36	115.81	114.36	116.77	114.36
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,059.57	$ 1,059.57	$ 1,059.57	$ 1,059.57	$ 1,072.96	$ 1,059.57	$ 1,072.96	$ 1,059.57	$ 1,081.83	$ 1,059.57
Annual savings in carbon tax for natural gas [$/year]	$ 264.46	$ 264.46	$ 264.46	$ 264.46	$ 267.81	$ 264.46	$ 267.81	$ 264.46	$ 270.02	$ 264.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,324.03	$ 1,324.03	$ 1,324.03	$ 1,324.03	$ 1,340.77	$ 1,324.03	$ 1,340.77	$ 1,324.03	$ 1,351.86	$ 1,324.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	5877	5877	5877	5877	5951.3	5877	5951.3	5877	6000.5	5877
Net Present Value [$]	$ 4,642.78	$ 4,615.28	$ 4,685.32	$ 4,749.56	$ 4,871.35	$ 4,915.55	$ 4,844.03	$ 5,103.66	$ 4,958.49	$ 5,076.16
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	14.09	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR80	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 1,163.13	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$.

MEDIUM Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,934.84	$ 22,071.59	$ 22,256.66	$ 22,231.12	$ 22,271.59	$ 22,571.59	$ 22,367.87	$ 22,552.94	$ 22,677.23	$ 22,567.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 32,946.13	$ 33,151.53	$ 33,429.5	$ 33,391.14	$ 33,451.93	$ 33,902.53	$ 33,596.54	$ 33,874.52	$ 34,061.2	$ 33,896.94
Net Present Value [$]	$ 1,073.85	$ 1,286.87	$ 1,347.74	$ 1,370.13	$ 1,425.61	$ 1,512.26	$ 1,583.15	$ 1,644.02	$ 1,710.85	$ 1,721.89
Incremental dollars per GHG saving	$ 4.93	$ 4.98	$ 4.99	$ 5.	$ 5.02	$ 5.03	$ 5.05	$ 5.06	$ 5.07	$ 5.08
Auxiliary Energy Required Heating [GJ/yr]	29.2	29.5	29	29.2	28.4	28.4	29.5	29	28.7	28.4
Annual Energy DHW [GJ/yr]	13.4	13.4	13.4	13.4	14.3	13.4	13.4	13.4	13.4	14.3
Annual Energy Space Heating [GJ/yr]	30.9	31.2	30.7	30.9	30	30	31.2	30.7	30.4	30
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	71.6	71.9	71.4	71.6	71.7	70.8	71.9	71.4	71.2	71.7
Design Heating Load [W]	6700.5	6682.6	6712.9	6700.5	6637.7	6637.7	6682.6	6712.9	6648.2	6637.7
Annual Energy Electricity [kWh/yr]	7745.6	7747.2	7744.6	7745.6	7741.3	7741.4	7747.2	7744.6	7743.4	7741.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,032.69	$ 1,032.91	$ 1,032.55	$ 1,032.69	$ 1,032.08	$ 1,032.09	$ 1,032.91	$ 1,032.55	$ 1,032.38	$ 1,032.08
Annual Energy Natural Gas [m3/yr]	1174	1182.6	1168.6	1174	1177.1	1151.6	1182.6	1168.6	1162.1	1177.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 506.42	$ 510.13	$ 504.09	$ 506.42	$ 507.76	$ 496.76	$ 510.13	$ 504.09	$ 501.29	$ 507.76
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	104352	104478	103920	104640	104495	104496	104766	104208	104928	104783
Upgrade Package List	Pkg4331302054	Pkg4331303053	Pkg4321303054	Pkg4331402054	Pkg4331303054	Pkg4331303054	Pkg4331403053	Pkg4321403054	Pkg4341302054	Pkg4331403054
GHGI [kg/m2]	9.95	10.02	9.91	9.95	9.98	9.77	10.02	9.91	9.86	9.98
% ICC	4.2%	4.2%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	34.6	34.9	34.3	34.6	33.6	33.6	34.9	34.3	34.1	33.6
Output: MEUI [kWh/(m2 * yr)]	54.5	54.9	54.2	54.5	54.6	53.5	54.9	54.2	54	54.6
Output: Better than ERS (%)	4740.0%	4720.0%	4760.0%	4740.0%	4740.0%	4800.0%	4720.0%	4760.0%	4770.0%	4740.0%
Output: Better than Envelope (%)	5670.0%	5630.0%	5700.0%	5670.0%	5790.0%	5790.0%	5630.0%	5700.0%	5750.0%	5790.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	557	555	558	557	561	561	555	558	559	561
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 78.54	$ 78.31	$ 78.68	$ 78.54	$ 79.14	$ 79.13	$ 78.31	$ 78.68	$ 78.85	$ 79.14
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 78.82	$ 78.59	$ 78.96	$ 78.82	$ 79.42	$ 79.41	$ 78.59	$ 78.96	$ 79.13	$ 79.42
Annual savings in GHG from electricity savings [kg CO2e/year]	6.1	6.1	6.1	6.1	6.2	6.2	6.1	6.1	6.2	6.2
Annual savings in natural gas [m3/year]	86.41	86.09	86.62	86.41	86.3	87.25	86.09	86.62	86.86	86.3
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 800.63	$ 797.66	$ 802.5	$ 800.63	$ 799.56	$ 808.36	$ 797.66	$ 802.5	$ 804.74	$ 799.56
Annual savings in carbon tax for natural gas [$/year]	$ 199.83	$ 199.09	$ 200.3	$ 199.83	$ 199.57	$ 201.76	$ 199.09	$ 200.3	$ 200.86	$ 199.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,000.47	$ 996.76	$ 1,002.79	$ 1,000.47	$ 999.13	$ 1,010.13	$ 996.76	$ 1,002.79	$ 1,005.6	$ 999.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	4440.8	4424.3	4451.1	4440.8	4434.8	4483.6	4424.3	4451.1	4463.5	4434.8
Net Present Value [$]	$ 1,073.85	$ 1,286.87	$ 1,347.74	$ 1,370.13	$ 1,425.61	$ 1,512.26	$ 1,583.15	$ 1,644.02	$ 1,710.85	$ 1,721.89
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	14.09	10.51	14.09	14.09	14.09	14.09	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.

MEDIUM Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60
Total increase in construction cost [$]	$ 6,309.63	$ 6,409.63	$ 6,429.51	$ 6,530.37	$ 6,624.56	$ 6,630.37	$ 6,650.25	$ 6,724.56	$ 6,744.44	$ 6,845.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,477.06	$ 9,627.26	$ 9,657.12	$ 9,808.62	$ 9,950.09	$ 9,958.82	$ 9,988.68	$ 10,100.29	$ 10,130.15	$ 10,281.64
Net Present Value [$]	$ 8,005.48	$ 8,046.84	$ 6,989.65	$ 7,978.05	$ 7,896.05	$ 8,021.28	$ 6,964.82	$ 7,933.82	$ 6,884.53	$ 7,868.8
Incremental dollars per GHG saving	$ 2.22	$ 2.2	$ 2.42	$ 2.26	$ 2.29	$ 2.25	$ 2.47	$ 2.28	$ 2.5	$ 2.33
Auxiliary Energy Required Heating [GJ/yr]	72.3	81.6	75.9	71.5	71.5	80.8	75.1	80.7	75.1	70.7
Annual Energy DHW [GJ/yr]	27	16.2	27	27	27	16.2	27	16.2	27	27
Annual Energy Space Heating [GJ/yr]	76.6	86.4	80.4	75.8	75.7	85.6	79.6	85.5	79.5	74.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	130	129	133.8	129.1	129.1	128.1	133	128.1	132.9	128.3
Design Heating Load [W]	12134.7	13094.9	12134.7	12020.5	12052.4	12980.6	12020.5	13012.5	12052.4	11938.1
Annual Energy Electricity [kWh/yr]	7716.4	7765.3	7735.5	7712.3	7712.1	7761.1	7731.3	7761	7731.1	7707.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,028.56	$ 1,035.47	$ 1,031.26	$ 1,027.98	$ 1,027.95	$ 1,034.88	$ 1,030.66	$ 1,034.87	$ 1,030.64	$ 1,027.35
Annual Energy Natural Gas [m3/yr]	2744.3	2712.4	2845.4	2722.5	2721.1	2690.4	2823.3	2689.6	2821.7	2699.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,183.8	$ 1,170.03	$ 1,227.41	$ 1,174.39	$ 1,173.79	$ 1,160.54	$ 1,217.87	$ 1,160.2	$ 1,217.18	$ 1,164.38
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116857	107140	116803	117127	118477	107410	117073	108760	118423	118747
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg2131101031	Pkg1121102031	Pkg2121102021	Pkg1131101031	Pkg2131101021	Pkg2131102031
GHGI [kg/m2]	22.78	22.52	23.61	22.6	22.59	22.34	23.43	22.33	23.41	22.41
% ICC	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	85.7	96.7	90	84.8	84.7	95.7	89	95.7	89	83.8
Output: MEUI [kWh/(m2 * yr)]	123.7	122.5	128.2	122.7	122.6	121.5	127.2	121.4	127.1	121.6
Output: Better than ERS (%)	2280.0%	2000.0%	2050.0%	2330.0%	2330.0%	2060.0%	2100.0%	2060.0%	2100.0%	2380.0%
Output: Better than Envelope (%)	450.0%	780.0%	30.0%	550.0%	550.0%	670.0%	80.0%	660.0%	80.0%	660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	734	686	715	738	739	690	720	690	720	743
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 103.55	$ 96.66	$ 100.86	$ 104.13	$ 104.16	$ 97.25	$ 101.45	$ 97.26	$ 101.48	$ 104.75
Annual savings in carbon tax for electricity [$/year]	$ .37	$ .34	$ .36	$ .37	$ .37	$ .34	$ .36	$ .34	$ .36	$ .37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 103.92	$ 97.	$ 101.21	$ 104.5	$ 104.53	$ 97.59	$ 101.81	$ 97.61	$ 101.84	$ 105.12
Annual savings in GHG from electricity savings [kg CO2e/year]	8.1	7.5	7.9	8.1	8.1	7.6	7.9	7.6	7.9	8.2
Annual savings in natural gas [m3/year]	55.27	56.45	51.5	56.08	56.13	57.27	52.32	57.3	52.38	56.94
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 512.04	$ 523.05	$ 477.14	$ 519.57	$ 520.05	$ 530.65	$ 484.77	$ 530.92	$ 485.32	$ 527.58
Annual savings in carbon tax for natural gas [$/year]	$ 127.8	$ 130.55	$ 119.09	$ 129.68	$ 129.8	$ 132.45	$ 121.	$ 132.52	$ 121.13	$ 131.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 639.84	$ 653.6	$ 596.23	$ 649.25	$ 649.85	$ 663.09	$ 605.77	$ 663.44	$ 606.46	$ 659.26
Annual savings in GHG from natural gas savings [kg CO2e/year]	2840.1	2901.1	2646.5	2881.8	2884.5	2943.3	2688.8	2944.8	2691.9	2926.2
Net Present Value [$]	$ 8,005.48	$ 8,046.84	$ 6,989.65	$ 7,978.05	$ 7,896.05	$ 8,021.28	$ 6,964.82	$ 7,933.82	$ 6,884.53	$ 7,868.8
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,358.64	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,358.64	$ 1,238.76	$ 1,358.64	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,220.87	$ 8,441.61	$ 8,535.8	$ 9,356.54	$ 8,770.87	$ 8,756.54	$ 9,559.63	$ 8,991.61	$ 9,070.87	$ 9,085.8
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,347.75	$ 12,679.3	$ 12,820.77	$ 14,053.52	$ 13,173.85	$ 13,152.32	$ 14,358.56	$ 13,505.4	$ 13,624.45	$ 13,646.87
Net Present Value [$]	$ 10,495.37	$ 10,453.07	$ 10,513.	$ 8,588.45	$ 10,648.41	$ 10,468.26	$ 9,059.58	$ 10,606.1	$ 10,684.65	$ 10,665.06
Incremental dollars per GHG saving	$ 1.25	$ 1.28	$ 1.3	$ 1.31	$ 1.32	$ 1.33	$ 1.34	$ 1.35	$ 1.35	$ 1.36
Auxiliary Energy Required Heating [GJ/yr]	84.8	84	83.9	84.1	84.8	83.1	81.3	84	84.8	83.9
Annual Energy DHW [GJ/yr]	27	27	27	16.2	25.2	27	16.2	25.2	24.1	25.2
Annual Energy Space Heating [GJ/yr]	47	46.7	46.6	46.4	47	46.2	46	46.7	47	46.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	101.6	101.3	101.2	89.9	99.9	100.8	90.3	99.5	98.7	99.4
Design Heating Load [W]	12988.8	12874.5	12906.4	12345.1	12988.8	12792.1	13198.6	12874.5	12988.8	12906.4
Annual Energy Electricity [kWh/yr]	20730.7	20628.2	20616.2	20495	20730.7	20513.1	20599.1	20628.2	20730.7	20616.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,870.08	$ 2,855.58	$ 2,853.88	$ 2,836.73	$ 2,870.08	$ 2,839.29	$ 2,851.46	$ 2,855.58	$ 2,870.08	$ 2,853.88
Annual Energy Natural Gas [m3/yr]	724.9	725	724.6	434.1	677.5	724.6	434.1	677.6	646	677.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 312.7	$ 312.74	$ 312.57	$ 187.26	$ 292.25	$ 312.57	$ 187.26	$ 292.29	$ 278.66	$ 292.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116758	117028	118378	118651	116759	118648	107149	117029	116760	118379
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2131101011	Pkg2131102011	Pkg2121101011	Pkg2131102011	Pkg1121101031	Pkg2121102011	Pkg2121101011	Pkg2131101011
GHGI [kg/m2]	6.89	6.89	6.89	4.51	6.51	6.88	4.51	6.5	6.25	6.5
% ICC	1.6%	1.6%	1.6%	1.8%	1.7%	1.7%	1.8%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	100.5	99.5	99.5	99.7	100.5	98.5	96.4	99.5	100.5	99.5
Output: MEUI [kWh/(m2 * yr)]	89.9	89.5	89.4	76.1	87.8	89	76.4	87.4	86.4	87.3
Output: Better than ERS (%)	3810.0%	3830.0%	3830.0%	4280.0%	3910.0%	3860.0%	4250.0%	3940.0%	3990.0%	3940.0%
Output: Better than Envelope (%)	1200.0%	1100.0%	1080.0%	1110.0%	1200.0%	980.0%	740.0%	1100.0%	1200.0%	1080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12280	12177	12165	12044	12280	12062	12148	12177	12280	12165
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,731.47	$ 1,717.01	$ 1,715.32	$ 1,698.23	$ 1,731.47	$ 1,700.78	$ 1,712.91	$ 1,717.01	$ 1,731.47	$ 1,715.32
Annual savings in carbon tax for electricity [$/year]	$ 6.14	$ 6.09	$ 6.08	$ 6.02	$ 6.14	$ 6.03	$ 6.07	$ 6.09	$ 6.14	$ 6.08
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,737.61	$ 1,723.1	$ 1,721.4	$ 1,704.25	$ 1,737.61	$ 1,706.82	$ 1,718.98	$ 1,723.1	$ 1,737.61	$ 1,721.4
Annual savings in GHG from electricity savings [kg CO2e/year]	135.1	134	133.8	132.5	135.1	132.7	133.6	134	135.1	133.8
Annual savings in natural gas [m3/year]	130.51	130.5	130.52	141.34	132.27	130.52	141.34	132.27	133.45	132.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,209.15	$ 1,209.11	$ 1,209.25	$ 1,309.53	$ 1,225.51	$ 1,209.25	$ 1,309.53	$ 1,225.47	$ 1,236.38	$ 1,225.65
Annual savings in carbon tax for natural gas [$/year]	$ 301.8	$ 301.79	$ 301.82	$ 326.85	$ 305.88	$ 301.82	$ 326.85	$ 305.87	$ 308.6	$ 305.92
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,510.94	$ 1,510.9	$ 1,511.07	$ 1,636.38	$ 1,531.39	$ 1,511.07	$ 1,636.38	$ 1,531.35	$ 1,544.98	$ 1,531.56
Annual savings in GHG from natural gas savings [kg CO2e/year]	6706.6	6706.4	6707.2	7263.4	6797.4	6707.2	7263.4	6797.2	6857.7	6798.1
Net Present Value [$]	$ 10,495.37	$ 10,453.07	$ 10,513.	$ 8,588.45	$ 10,648.41	$ 10,468.26	$ 9,059.58	$ 10,606.1	$ 10,684.65	$ 10,665.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	USI1 40 SHGC0 35	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,238.76	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$ 550.

MEDIUM Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,436.03	$ 8,656.77	$ 6,909.63	$ 7,130.37	$ 8,750.96	$ 7,224.56	$ 8,971.7	$ 7,445.3	$ 8,986.03	$ 9,206.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,670.92	$ 13,002.47	$ 10,378.26	$ 10,709.82	$ 13,143.94	$ 10,851.29	$ 13,475.49	$ 11,182.84	$ 13,497.02	$ 13,828.57
Net Present Value [$]	$ 9,662.66	$ 9,636.5	$ 9,634.94	$ 9,609.2	$ 9,548.5	$ 9,523.08	$ 9,521.97	$ 9,497.28	$ 9,448.12	$ 9,422.14
Incremental dollars per GHG saving	$ 2.28	$ 2.32	$ 2.06	$ 2.1	$ 2.34	$ 2.12	$ 2.37	$ 2.16	$ 2.38	$ 2.41
Auxiliary Energy Required Heating [GJ/yr]	66.9	66.1	73.1	72.3	66	72.3	65.3	71.5	66.9	66.1
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.7	14.7
Annual Energy Space Heating [GJ/yr]	70.8	70	77.5	76.6	70	76.6	69.1	75.8	70.8	70
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	113.4	112.5	120	119.2	112.5	119.2	111.7	118.3	111.9	111.1
Design Heating Load [W]	11033.9	10919.6	11689.1	11574.8	10951.6	11606.8	10837.3	11492.5	11033.9	10919.6
Annual Energy Electricity [kWh/yr]	7687.5	7683.4	7720.7	7716.6	7683.3	7716.4	7679.1	7712.2	7687.6	7683.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,024.47	$ 1,023.89	$ 1,029.16	$ 1,028.58	$ 1,023.87	$ 1,028.56	$ 1,023.28	$ 1,027.96	$ 1,024.48	$ 1,023.9
Annual Energy Natural Gas [m3/yr]	2301.5	2279.5	2476.8	2454.8	2278.8	2453.9	2256.9	2431.9	2261.4	2239.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 992.79	$ 983.3	$ 1,068.41	$ 1,058.92	$ 982.99	$ 1,058.53	$ 973.55	$ 1,049.04	$ 975.49	$ 966.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	123232	123502	116860	117130	126364	118480	126634	118750	123233	123503
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2121101031	Pkg2121102031	Pkg2231101031	Pkg2131101031	Pkg2231102031	Pkg2131102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	19.16	18.98	20.59	20.41	18.98	20.41	18.8	20.23	18.83	18.65
% ICC	1.6%	1.7%	1.3%	1.4%	1.7%	1.4%	1.7%	1.4%	1.7%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	79.2	78.3	86.7	85.7	78.3	85.7	77.3	84.8	79.2	78.3
Output: MEUI [kWh/(m2 * yr)]	104	103	111.9	110.9	103	110.9	102	109.9	102.2	101.2
Output: Better than ERS (%)	2970.0%	3030.0%	2560.0%	2610.0%	3030.0%	2610.0%	3080.0%	2670.0%	3060.0%	3110.0%
Output: Better than Envelope (%)	1160.0%	1270.0%	340.0%	450.0%	1280.0%	450.0%	1370.0%	550.0%	1160.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	763	767	730	734	768	734	772	739	763	767
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 107.63	$ 108.2	$ 102.94	$ 103.52	$ 108.22	$ 103.55	$ 108.81	$ 104.14	$ 107.61	$ 108.19
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .37	$ .37	$ .38	$ .37	$ .39	$ .37	$ .38	$ .38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 108.01	$ 108.59	$ 103.31	$ 103.89	$ 108.6	$ 103.92	$ 109.2	$ 104.51	$ 107.99	$ 108.57
Annual savings in GHG from electricity savings [kg CO2e/year]	8.4	8.4	8	8.1	8.4	8.1	8.5	8.1	8.4	8.4
Annual savings in natural gas [m3/year]	71.76	72.58	65.23	66.05	72.61	66.09	73.43	66.91	73.26	74.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 664.9	$ 672.49	$ 604.38	$ 611.98	$ 672.73	$ 612.29	$ 680.29	$ 619.88	$ 678.74	$ 686.33
Annual savings in carbon tax for natural gas [$/year]	$ 165.96	$ 167.85	$ 150.85	$ 152.75	$ 167.91	$ 152.82	$ 169.8	$ 154.72	$ 169.41	$ 171.31
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 830.85	$ 840.34	$ 755.23	$ 764.72	$ 840.64	$ 765.11	$ 850.09	$ 774.6	$ 848.15	$ 857.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	3687.9	3730	3352.2	3394.4	3731.4	3396.1	3773.3	3438.2	3764.7	3806.8
Net Present Value [$]	$ 9,662.66	$ 9,636.5	$ 9,634.94	$ 9,609.2	$ 9,548.5	$ 9,523.08	$ 9,521.97	$ 9,497.28	$ 9,448.12	$ 9,422.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	3.87	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 4,812.4	$ 3,286.	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

MEDIUM Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,566.77	$ 12,660.96	$ 12,786.03	$ 12,881.7	$ 13,006.77	$ 13,100.96	$ 13,116.77	$ 13,210.96	$ 13,321.7	$ 13,336.03
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 18,875.29	$ 19,016.76	$ 19,204.62	$ 19,348.31	$ 19,536.17	$ 19,677.64	$ 19,701.39	$ 19,842.86	$ 20,009.19	$ 20,030.72
Net Present Value [$]	$ 8,472.81	$ 8,520.09	$ 8,060.87	$ 8,499.87	$ 7,998.23	$ 8,051.6	$ 8,625.59	$ 8,673.12	$ 8,029.74	$ 8,213.9
Incremental dollars per GHG saving	$ 1.91	$ 1.92	$ 1.94	$ 1.95	$ 1.97	$ 1.98	$ 1.96	$ 1.98	$ 2.02	$ 1.99
Auxiliary Energy Required Heating [GJ/yr]	63.2	63.2	61.5	62.5	60.8	60.8	63.2	63.2	60	61.5
Annual Energy DHW [GJ/yr]	27	27	27	27	27	27	25.3	25.2	27	25.3
Annual Energy Space Heating [GJ/yr]	36.6	36.5	35.7	36.2	35.3	35.3	36.6	36.5	34.9	35.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	92.7	92.7	91.9	92.3	91.5	91.4	91	90.9	91.1	90.1
Design Heating Load [W]	10585.2	10617.1	10475	10502.8	10360.7	10392.6	10585.2	10617.1	10278.4	10475
Annual Energy Electricity [kWh/yr]	18254	18237.5	18008.5	18143.5	17898.2	17883.9	18254	18237.5	17789.3	18008.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,519.63	$ 2,517.29	$ 2,484.89	$ 2,503.99	$ 2,469.28	$ 2,467.26	$ 2,519.63	$ 2,517.29	$ 2,453.87	$ 2,484.89
Annual Energy Natural Gas [m3/yr]	725.8	725.3	725.9	725.4	726	725.5	678.4	677.9	725.6	678.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.08	$ 312.87	$ 313.13	$ 312.91	$ 313.17	$ 312.96	$ 292.64	$ 292.42	$ 313.	$ 292.68
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123526	126388	123274	126658	123544	126406	123527	126389	126676	123275
Upgrade Package List	Pkg2221102032	Pkg2231101032	Pkg2221101033	Pkg2231102032	Pkg2221102033	Pkg2231101033	Pkg2221102032	Pkg2231101032	Pkg2231102033	Pkg2221101033
GHGI [kg/m2]	6.79	6.78	6.77	6.78	6.77	6.77	6.4	6.39	6.76	6.39
% ICC	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	74.9	74.9	72.9	74	72	72	74.9	74.9	71.1	72.9
Output: MEUI [kWh/(m2 * yr)]	79.2	79.2	78.2	78.8	77.7	77.7	77.2	77.1	77.3	76.1
Output: Better than ERS (%)	4350.0%	4350.0%	4400.0%	4380.0%	4420.0%	4430.0%	4450.0%	4460.0%	4450.0%	4510.0%
Output: Better than Envelope (%)	1650.0%	1650.0%	1880.0%	1740.0%	1970.0%	1970.0%	1650.0%	1650.0%	2070.0%	1880.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9803	9787	9558	9693	9447	9433	9803	9787	9338	9558
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,382.25	$ 1,379.92	$ 1,347.64	$ 1,366.67	$ 1,332.08	$ 1,330.07	$ 1,382.25	$ 1,379.92	$ 1,316.73	$ 1,347.64
Annual savings in carbon tax for electricity [$/year]	$ 4.9	$ 4.89	$ 4.78	$ 4.85	$ 4.72	$ 4.72	$ 4.9	$ 4.89	$ 4.67	$ 4.78
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,387.15	$ 1,384.82	$ 1,352.41	$ 1,371.52	$ 1,336.81	$ 1,334.78	$ 1,387.15	$ 1,384.82	$ 1,321.4	$ 1,352.41
Annual savings in GHG from electricity savings [kg CO2e/year]	107.8	107.7	105.1	106.6	103.9	103.8	107.8	107.7	102.7	105.1
Annual savings in natural gas [m3/year]	130.47	130.49	130.47	130.49	130.47	130.48	132.24	132.26	130.48	132.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,208.83	$ 1,209.01	$ 1,208.8	$ 1,208.97	$ 1,208.77	$ 1,208.94	$ 1,225.2	$ 1,225.37	$ 1,208.9	$ 1,225.16
Annual savings in carbon tax for natural gas [$/year]	$ 301.72	$ 301.76	$ 301.71	$ 301.75	$ 301.7	$ 301.75	$ 305.8	$ 305.85	$ 301.74	$ 305.79
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,510.55	$ 1,510.77	$ 1,510.51	$ 1,510.73	$ 1,510.47	$ 1,510.68	$ 1,531.	$ 1,531.22	$ 1,510.64	$ 1,530.96
Annual savings in GHG from natural gas savings [kg CO2e/year]	6704.9	6705.8	6704.7	6705.6	6704.5	6705.5	6795.6	6796.6	6705.3	6795.4
Net Present Value [$]	$ 8,472.81	$ 8,520.09	$ 8,060.87	$ 8,499.87	$ 7,998.23	$ 8,051.6	$ 8,625.59	$ 8,673.12	$ 8,029.74	$ 8,213.9
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 550.

MEDIUM Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 13,386.03	$ 13,481.7	$ 13,606.77	$ 12,566.77	$ 13,700.96	$ 12,660.96	$ 13,936.03	$ 12,786.03	$ 14,031.7	$ 13,921.7
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,105.82	$ 20,249.51	$ 20,437.37	$ 18,875.29	$ 20,578.84	$ 19,016.76	$ 20,931.92	$ 19,204.62	$ 21,075.61	$ 20,910.39
Net Present Value [$]	$ 6,186.02	$ 6,607.24	$ 6,079.02	$ 8,472.81	$ 6,164.44	$ 8,520.09	$ 6,401.54	$ 8,060.87	$ 6,822.95	$ 6,118.25
Incremental dollars per GHG saving	$ 1.87	$ 1.88	$ 1.9	$ 1.91	$ 1.91	$ 1.92	$ 1.93	$ 1.94	$ 1.94	$ 1.94
Auxiliary Energy Required Heating [GJ/yr]	62.2	63.2	61.5	63.2	61.5	63.2	62.2	61.5	63.2	60.7
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	27	16.2	27	14.7	27	14.7	16.2
Annual Energy Space Heating [GJ/yr]	35.7	36.1	35.2	36.6	35.2	36.5	35.7	35.7	36.1	34.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	81	81.4	80.5	92.7	80.5	92.7	79.5	91.9	79.9	80.1
Design Heating Load [W]	10027.9	10055.8	9913.6	10585.2	9945.5	10617.1	10027.9	10475	10055.8	9831.3
Annual Energy Electricity [kWh/yr]	17996.6	18123.1	17869.3	18254	17865.9	18237.5	17998.2	18008.5	18124.7	17762.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,483.2	$ 2,501.1	$ 2,465.19	$ 2,519.63	$ 2,464.71	$ 2,517.29	$ 2,483.43	$ 2,484.89	$ 2,501.33	$ 2,450.04
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	725.8	434.1	725.3	393.7	725.9	393.7	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 313.08	$ 187.26	$ 312.87	$ 169.83	$ 313.13	$ 169.83	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123277	126661	123547	123526	126409	126388	123278	123274	126662	126679
Upgrade Package List	Pkg2221101033	Pkg2231102032	Pkg2221102033	Pkg2221102032	Pkg2231101033	Pkg2231101032	Pkg2221101033	Pkg2221101033	Pkg2231102032	Pkg2231102033
GHGI [kg/m2]	4.39	4.4	4.38	6.79	4.38	6.78	4.06	6.77	4.07	4.38
% ICC	2.6%	2.6%	2.6%	2.4%	2.6%	2.4%	2.7%	2.4%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	73.8	74.8	72.8	74.9	72.8	74.9	73.8	72.9	74.9	71.9
Output: MEUI [kWh/(m2 * yr)]	65.3	65.8	64.7	79.2	64.7	79.2	63.5	78.2	64	64.3
Output: Better than ERS (%)	4840.0%	4820.0%	4880.0%	4350.0%	4880.0%	4350.0%	4940.0%	4400.0%	4910.0%	4900.0%
Output: Better than Envelope (%)	1780.0%	1650.0%	1880.0%	1650.0%	1880.0%	1650.0%	1780.0%	1880.0%	1650.0%	1980.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9546	9672	9418	9803	9415	9787	9547	9558	9674	9311
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,345.96	$ 1,363.79	$ 1,328.01	$ 1,382.25	$ 1,327.53	$ 1,379.92	$ 1,346.18	$ 1,347.64	$ 1,364.02	$ 1,312.91
Annual savings in carbon tax for electricity [$/year]	$ 4.77	$ 4.84	$ 4.71	$ 4.9	$ 4.71	$ 4.89	$ 4.77	$ 4.78	$ 4.84	$ 4.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,350.73	$ 1,368.63	$ 1,332.72	$ 1,387.15	$ 1,332.24	$ 1,384.82	$ 1,350.96	$ 1,352.41	$ 1,368.86	$ 1,317.56
Annual savings in GHG from electricity savings [kg CO2e/year]	105	106.4	103.6	107.8	103.6	107.7	105	105.1	106.4	102.4
Annual savings in natural gas [m3/year]	141.34	141.34	141.34	130.47	141.34	130.49	142.85	130.47	142.85	141.34
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,309.53	$ 1,309.53	$ 1,309.53	$ 1,208.83	$ 1,309.53	$ 1,209.01	$ 1,323.48	$ 1,208.8	$ 1,323.48	$ 1,309.53
Annual savings in carbon tax for natural gas [$/year]	$ 326.85	$ 326.85	$ 326.85	$ 301.72	$ 326.85	$ 301.76	$ 330.33	$ 301.71	$ 330.33	$ 326.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,636.38	$ 1,636.38	$ 1,636.38	$ 1,510.55	$ 1,636.38	$ 1,510.77	$ 1,653.81	$ 1,510.51	$ 1,653.81	$ 1,636.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	7263.4	7263.4	7263.4	6704.9	7263.4	6705.8	7340.7	6704.7	7340.7	7263.4
Net Present Value [$]	$ 6,186.02	$ 6,607.24	$ 6,079.02	$ 8,472.81	$ 6,164.44	$ 8,520.09	$ 6,401.54	$ 8,060.87	$ 6,822.95	$ 6,118.25
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.

MEDIUM Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,481.08	$ 14,596.01	$ 14,560.34	$ 14,781.08	$ 14,575.27	$ 14,796.01	$ 14,875.27	$ 14,617.83	$ 15,096.01	$ 14,891.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,750.58	$ 21,923.21	$ 21,869.63	$ 22,201.18	$ 21,892.06	$ 22,223.61	$ 22,342.66	$ 21,955.98	$ 22,674.21	$ 22,367.72
Net Present Value [$]	$ 6,964.61	$ 6,956.91	$ 6,915.77	$ 6,887.36	$ 6,869.45	$ 6,840.13	$ 6,793.17	$ 6,770.16	$ 6,763.67	$ 6,712.45
Incremental dollars per GHG saving	$ 3.17	$ 3.18	$ 3.18	$ 3.2	$ 3.19	$ 3.21	$ 3.22	$ 3.21	$ 3.24	$ 3.24
Auxiliary Energy Required Heating [GJ/yr]	52	52.5	52.8	52	52	51.3	52	52.3	51.3	50
Annual Energy DHW [GJ/yr]	14.7	13.7	13.7	13.7	14.7	14.7	13.7	14.7	13.7	16.2
Annual Energy Space Heating [GJ/yr]	55.1	55.6	55.9	55.1	55.1	54.3	55.1	55.4	54.3	53
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	97.1	96.6	96.9	96.1	97.1	96.3	96.1	97.3	95.3	96.5
Design Heating Load [W]	8615.1	8580.9	8729.4	8615.1	8647	8532.8	8647	8596	8532.8	8110
Annual Energy Electricity [kWh/yr]	7866.5	7869	7870.6	7866.5	7866.5	7862.4	7866.5	7867.7	7862.5	7855.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,049.79	$ 1,050.15	$ 1,050.37	$ 1,049.79	$ 1,049.79	$ 1,049.21	$ 1,049.79	$ 1,049.96	$ 1,049.23	$ 1,048.29
Annual Energy Natural Gas [m3/yr]	1846.9	1833.3	1842	1820.3	1847	1825.4	1820.3	1853.4	1798.7	1831.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 796.69	$ 790.82	$ 794.57	$ 785.21	$ 796.73	$ 787.41	$ 785.21	$ 799.49	$ 775.9	$ 789.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	149081	151008	148866	149082	150809	151025	150810	149279	151026	156388
Upgrade Package List	Pkg3321202034	Pkg3331202033	Pkg3321201034	Pkg3321202034	Pkg3331201034	Pkg3331202034	Pkg3331201034	Pkg3321203033	Pkg3331202034	Pkg4321302033
GHGI [kg/m2]	15.46	15.34	15.42	15.24	15.46	15.28	15.24	15.51	15.06	15.33
% ICC	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	61.7	62.2	62.6	61.7	61.7	60.7	61.7	61.9	60.8	59.3
Output: MEUI [kWh/(m2 * yr)]	84.7	84.1	84.5	83.5	84.7	83.7	83.5	85	82.6	84
Output: Better than ERS (%)	3980.0%	4010.0%	3990.0%	4040.0%	3980.0%	4030.0%	4040.0%	3970.0%	4090.0%	4020.0%
Output: Better than Envelope (%)	3130.0%	3060.0%	3030.0%	3130.0%	3130.0%	3220.0%	3130.0%	3090.0%	3220.0%	3390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	584	582	580	584	584	588	584	583	588	595
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 82.39	$ 82.03	$ 81.81	$ 82.39	$ 82.39	$ 82.96	$ 82.39	$ 82.22	$ 82.95	$ 83.88
Annual savings in carbon tax for electricity [$/year]	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 82.68	$ 82.32	$ 82.1	$ 82.68	$ 82.68	$ 83.26	$ 82.68	$ 82.51	$ 83.24	$ 84.18
Annual savings in GHG from electricity savings [kg CO2e/year]	6.4	6.4	6.4	6.4	6.4	6.5	6.4	6.4	6.5	6.5
Annual savings in natural gas [m3/year]	88.7	89.21	88.88	89.69	88.7	89.5	89.69	88.46	90.5	89.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 821.83	$ 826.52	$ 823.52	$ 831.01	$ 821.79	$ 829.25	$ 831.01	$ 819.58	$ 838.47	$ 827.25
Annual savings in carbon tax for natural gas [$/year]	$ 205.12	$ 206.3	$ 205.55	$ 207.42	$ 205.12	$ 206.98	$ 207.42	$ 204.56	$ 209.28	$ 206.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,026.95	$ 1,032.82	$ 1,029.06	$ 1,038.43	$ 1,026.91	$ 1,036.23	$ 1,038.43	$ 1,024.15	$ 1,047.74	$ 1,033.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	4558.3	4584.4	4567.7	4609.2	4558.1	4599.5	4609.2	4545.9	4650.6	4588.4
Net Present Value [$]	$ 6,964.61	$ 6,956.91	$ 6,915.77	$ 6,887.36	$ 6,869.45	$ 6,840.13	$ 6,793.17	$ 6,770.16	$ 6,763.67	$ 6,712.45
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	8.78	10.51	8.78	14.09	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$.

MEDIUM Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 17,756.89	$ 17,941.96	$ 18,053.17	$ 18,078.71	$ 18,238.24	$ 18,256.89	$ 18,306.89	$ 18,374.99	$ 18,393.64	$ 18,491.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 26,670.85	$ 26,948.82	$ 27,115.86	$ 27,154.22	$ 27,393.84	$ 27,421.85	$ 27,496.95	$ 27,599.23	$ 27,627.25	$ 27,774.92
Net Present Value [$]	$ 7,632.51	$ 7,750.36	$ 7,928.79	$ 7,888.71	$ 8,046.64	$ 7,769.03	$ 7,784.57	$ 8,184.99	$ 7,929.1	$ 7,903.4
Incremental dollars per GHG saving	$ 2.68	$ 2.71	$ 2.73	$ 2.73	$ 2.75	$ 2.76	$ 2.73	$ 2.78	$ 2.78	$ 2.76
Auxiliary Energy Required Heating [GJ/yr]	48.1	47.6	48.1	47.8	47.6	46.9	48.1	47.8	47.1	47.6
Annual Energy DHW [GJ/yr]	27	27.1	27	27	27.1	27	25.3	27	27	25.3
Annual Energy Space Heating [GJ/yr]	28.2	28	28.2	28.1	28	27.6	28.2	28.1	27.7	28
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	84.3	84.2	84.3	84.2	84.2	83.8	82.5	84.2	83.8	82.5
Design Heating Load [W]	8500.7	8534.9	8500.7	8515.8	8534.9	8452.6	8500.7	8515.8	8433.4	8534.9
Annual Energy Electricity [kWh/yr]	15911.6	15882.9	15911.6	15884.5	15882.9	15769.2	15911.6	15884.5	15779.2	15882.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,188.18	$ 2,184.12	$ 2,188.18	$ 2,184.34	$ 2,184.12	$ 2,168.03	$ 2,188.18	$ 2,184.34	$ 2,169.44	$ 2,184.12
Annual Energy Natural Gas [m3/yr]	725.8	726.6	725.8	726.3	726.6	726.2	678.3	726.3	725.9	679.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.08	$ 313.43	$ 313.08	$ 313.3	$ 313.43	$ 313.26	$ 292.59	$ 313.3	$ 313.13	$ 292.98
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156970	156412	157258	156538	156700	156988	156971	156826	157114	156413
Upgrade Package List	Pkg4331302033	Pkg4321302034	Pkg4331402033	Pkg4321303033	Pkg4321402034	Pkg4331302034	Pkg4331302033	Pkg4321403033	Pkg4331303033	Pkg4321302034
GHGI [kg/m2]	6.68	6.68	6.68	6.68	6.68	6.67	6.29	6.68	6.67	6.29
% ICC	3.4%	3.4%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	57	56.4	57	56.7	56.4	55.6	57	56.7	55.8	56.4
Output: MEUI [kWh/(m2 * yr)]	69.2	69.2	69.2	69.2	69.2	68.7	67.2	69.2	68.7	67.1
Output: Better than ERS (%)	4860.0%	4870.0%	4860.0%	4870.0%	4870.0%	4890.0%	4970.0%	4870.0%	4890.0%	4970.0%
Output: Better than Envelope (%)	3650.0%	3710.0%	3650.0%	3690.0%	3710.0%	3800.0%	3650.0%	3690.0%	3780.0%	3710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7461	7432	7461	7434	7432	7318	7461	7434	7328	7432
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,051.97	$ 1,047.93	$ 1,051.97	$ 1,048.15	$ 1,047.93	$ 1,031.89	$ 1,051.97	$ 1,048.15	$ 1,033.3	$ 1,047.93
Annual savings in carbon tax for electricity [$/year]	$ 3.73	$ 3.72	$ 3.73	$ 3.72	$ 3.72	$ 3.66	$ 3.73	$ 3.72	$ 3.66	$ 3.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,055.7	$ 1,051.64	$ 1,055.7	$ 1,051.87	$ 1,051.64	$ 1,035.55	$ 1,055.7	$ 1,051.87	$ 1,036.97	$ 1,051.64
Annual savings in GHG from electricity savings [kg CO2e/year]	82.1	81.8	82.1	81.8	81.8	80.5	82.1	81.8	80.6	81.8
Annual savings in natural gas [m3/year]	130.47	130.44	130.47	130.45	130.44	130.46	132.24	130.45	130.47	132.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,208.83	$ 1,208.56	$ 1,208.83	$ 1,208.66	$ 1,208.56	$ 1,208.7	$ 1,225.23	$ 1,208.66	$ 1,208.8	$ 1,224.92
Annual savings in carbon tax for natural gas [$/year]	$ 301.72	$ 301.65	$ 301.72	$ 301.68	$ 301.65	$ 301.69	$ 305.81	$ 301.68	$ 301.71	$ 305.73
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,510.55	$ 1,510.21	$ 1,510.55	$ 1,510.34	$ 1,510.21	$ 1,510.38	$ 1,531.04	$ 1,510.34	$ 1,510.51	$ 1,530.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	6704.9	6703.3	6704.9	6703.9	6703.3	6704.1	6795.8	6703.9	6704.7	6794.1
Net Present Value [$]	$ 7,632.51	$ 7,750.36	$ 7,928.79	$ 7,888.71	$ 8,046.64	$ 7,769.03	$ 7,784.57	$ 8,184.99	$ 7,929.1	$ 7,903.4
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	14.09	10.51	10.51	10.51	14.09	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

MEDIUM Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 18,856.89	$ 18,993.64	$ 19,153.17	$ 19,178.71	$ 19,406.89	$ 17,756.89	$ 19,289.92	$ 19,543.64	$ 19,706.89	$ 17,941.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 28,323.05	$ 28,528.45	$ 28,768.06	$ 28,806.42	$ 29,149.15	$ 26,670.85	$ 28,973.46	$ 29,354.55	$ 29,599.75	$ 26,948.82
Net Present Value [$]	$ 6,030.89	$ 6,182.79	$ 6,327.17	$ 6,288.07	$ 6,246.6	$ 7,632.51	$ 6,479.07	$ 6,398.5	$ 6,324.16	$ 7,750.36
Incremental dollars per GHG saving	$ 2.63	$ 2.64	$ 2.67	$ 2.67	$ 2.67	$ 2.68	$ 2.69	$ 2.69	$ 2.7	$ 2.71
Auxiliary Energy Required Heating [GJ/yr]	47.8	48.1	47.8	47.6	47.9	48.1	48.1	48.1	47.9	47.6
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	14.7	27	16.2	14.7	13.7	27.1
Annual Energy Space Heating [GJ/yr]	27.8	27.8	27.8	27.7	27.8	28.2	27.8	27.8	27.8	28
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	73.1	73.1	73.1	73	71.6	84.3	73.1	71.6	70.6	84.2
Design Heating Load [W]	8067.7	8048.6	8067.7	8082.8	8067.7	8500.7	8048.6	8048.6	8067.7	8534.9
Annual Energy Electricity [kWh/yr]	15811.3	15817.2	15811.3	15786.2	15812.9	15911.6	15817.2	15818.8	15814	15882.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,173.98	$ 2,174.82	$ 2,173.98	$ 2,170.43	$ 2,174.21	$ 2,188.18	$ 2,174.82	$ 2,175.05	$ 2,174.37	$ 2,184.12
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	393.7	725.8	434.1	393.7	366.8	726.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 313.08	$ 187.26	$ 169.83	$ 158.22	$ 313.43
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156991	157117	157279	156559	156992	156970	157405	157118	156993	156412
Upgrade Package List	Pkg4331302034	Pkg4331303033	Pkg4331402034	Pkg4321303034	Pkg4331302034	Pkg4331302033	Pkg4331403033	Pkg4331303033	Pkg4331302034	Pkg4321302034
GHGI [kg/m2]	4.29	4.29	4.29	4.29	3.96	6.68	4.29	3.96	3.74	6.68
% ICC	3.6%	3.6%	3.7%	3.7%	3.7%	3.4%	3.7%	3.7%	3.8%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.7	57	56.7	56.4	56.7	57	57	57	56.7	56.4
Output: MEUI [kWh/(m2 * yr)]	56	56	56	55.8	54.2	69.2	56	54.2	53	69.2
Output: Better than ERS (%)	5350.0%	5350.0%	5350.0%	5350.0%	5440.0%	4860.0%	5350.0%	5440.0%	5510.0%	4870.0%
Output: Better than Envelope (%)	3690.0%	3650.0%	3690.0%	3710.0%	3670.0%	3650.0%	3650.0%	3650.0%	3670.0%	3710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7360	7366	7360	7335	7362	7461	7366	7368	7363	7432
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,037.83	$ 1,038.66	$ 1,037.83	$ 1,034.29	$ 1,038.06	$ 1,051.97	$ 1,038.66	$ 1,038.89	$ 1,038.21	$ 1,047.93
Annual savings in carbon tax for electricity [$/year]	$ 3.68	$ 3.68	$ 3.68	$ 3.67	$ 3.68	$ 3.73	$ 3.68	$ 3.68	$ 3.68	$ 3.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,041.51	$ 1,042.35	$ 1,041.51	$ 1,037.96	$ 1,041.74	$ 1,055.7	$ 1,042.35	$ 1,042.57	$ 1,041.89	$ 1,051.64
Annual savings in GHG from electricity savings [kg CO2e/year]	81	81	81	80.7	81	82.1	81	81	81	81.8
Annual savings in natural gas [m3/year]	141.34	141.34	141.34	141.34	142.85	130.47	141.34	142.85	143.85	130.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,309.53	$ 1,309.53	$ 1,309.53	$ 1,309.53	$ 1,323.48	$ 1,208.83	$ 1,309.53	$ 1,323.48	$ 1,332.76	$ 1,208.56
Annual savings in carbon tax for natural gas [$/year]	$ 326.85	$ 326.85	$ 326.85	$ 326.85	$ 330.33	$ 301.72	$ 326.85	$ 330.33	$ 332.65	$ 301.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,636.38	$ 1,636.38	$ 1,636.38	$ 1,636.38	$ 1,653.81	$ 1,510.55	$ 1,636.38	$ 1,653.81	$ 1,665.41	$ 1,510.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	7263.4	7263.4	7263.4	7263.4	7340.7	6704.9	7263.4	7340.7	7392.3	6703.3
Net Present Value [$]	$ 6,030.89	$ 6,182.79	$ 6,327.17	$ 6,288.07	$ 6,246.6	$ 7,632.51	$ 6,479.07	$ 6,398.5	$ 6,324.16	$ 7,750.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	14.09	10.51	10.51	14.09	14.09	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

MEDIUM Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,856.89	$ 18,993.64	$ 19,406.89	$ 19,178.71	$ 19,706.89	$ 19,153.17	$ 19,493.64	$ 19,543.64	$ 19,843.64	$ 19,289.92
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 28,323.05	$ 28,528.45	$ 29,149.15	$ 28,806.42	$ 29,599.75	$ 28,768.06	$ 29,279.45	$ 29,354.55	$ 29,805.15	$ 28,973.46
Net Present Value [$]	$ 6,030.89	$ 6,182.79	$ 6,246.6	$ 6,288.07	$ 6,324.16	$ 6,327.17	$ 6,330.59	$ 6,398.5	$ 6,475.88	$ 6,479.07
Incremental dollars per GHG saving	$ 2.63	$ 2.64	$ 2.67	$ 2.67	$ 2.7	$ 2.67	$ 2.71	$ 2.69	$ 2.71	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	47.8	48.1	47.9	47.6	47.9	47.8	46.8	48.1	48.1	48.1
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	16.2	13.7	16.2	16.2	14.7	13.7	16.2
Annual Energy Space Heating [GJ/yr]	27.8	27.8	27.8	27.7	27.8	27.8	27.3	27.8	27.8	27.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	73.1	73.1	71.6	73	70.6	73.1	72.6	71.6	70.6	73.1
Design Heating Load [W]	8067.7	8048.6	8067.7	8082.8	8067.7	8067.7	8000.5	8048.6	8048.6	8048.6
Annual Energy Electricity [kWh/yr]	15811.3	15817.2	15812.9	15786.2	15814	15811.3	15680.4	15818.8	15819.8	15817.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,173.98	$ 2,174.82	$ 2,174.21	$ 2,170.43	$ 2,174.37	$ 2,173.98	$ 2,155.46	$ 2,175.05	$ 2,175.19	$ 2,174.82
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	434.1	366.8	434.1	434.1	393.7	366.8	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 158.22	$ 187.26	$ 187.26	$ 169.83	$ 158.22	$ 187.26
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156991	157117	156992	156559	156993	157279	157135	157118	157119	157405
Upgrade Package List	Pkg4331302034	Pkg4331303033	Pkg4331302034	Pkg4321303034	Pkg4331302034	Pkg4331402034	Pkg4331303034	Pkg4331303033	Pkg4331303033	Pkg4331403033
GHGI [kg/m2]	4.29	4.29	3.96	4.29	3.74	4.29	4.28	3.96	3.74	4.29
% ICC	3.6%	3.6%	3.7%	3.7%	3.8%	3.7%	3.7%	3.7%	3.8%	3.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.7	57	56.7	56.4	56.7	56.7	55.5	57	57	57
Output: MEUI [kWh/(m2 * yr)]	56	56	54.2	55.8	53	56	55.4	54.2	53	56
Output: Better than ERS (%)	5350.0%	5350.0%	5440.0%	5350.0%	5510.0%	5350.0%	5380.0%	5440.0%	5510.0%	5350.0%
Output: Better than Envelope (%)	3690.0%	3650.0%	3670.0%	3710.0%	3670.0%	3690.0%	3820.0%	3650.0%	3650.0%	3650.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7360	7366	7362	7335	7363	7360	7230	7368	7369	7366
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,037.83	$ 1,038.66	$ 1,038.06	$ 1,034.29	$ 1,038.21	$ 1,037.83	$ 1,019.37	$ 1,038.89	$ 1,039.03	$ 1,038.66
Annual savings in carbon tax for electricity [$/year]	$ 3.68	$ 3.68	$ 3.68	$ 3.67	$ 3.68	$ 3.68	$ 3.61	$ 3.68	$ 3.68	$ 3.68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,041.51	$ 1,042.35	$ 1,041.74	$ 1,037.96	$ 1,041.89	$ 1,041.51	$ 1,022.99	$ 1,042.57	$ 1,042.71	$ 1,042.35
Annual savings in GHG from electricity savings [kg CO2e/year]	81	81	81	80.7	81	81	79.5	81	81.1	81
Annual savings in natural gas [m3/year]	141.34	141.34	142.85	141.34	143.85	141.34	141.34	142.85	143.85	141.34
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,309.53	$ 1,309.53	$ 1,323.48	$ 1,309.53	$ 1,332.76	$ 1,309.53	$ 1,309.53	$ 1,323.48	$ 1,332.76	$ 1,309.53
Annual savings in carbon tax for natural gas [$/year]	$ 326.85	$ 326.85	$ 330.33	$ 326.85	$ 332.65	$ 326.85	$ 326.85	$ 330.33	$ 332.65	$ 326.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,636.38	$ 1,636.38	$ 1,653.81	$ 1,636.38	$ 1,665.41	$ 1,636.38	$ 1,636.38	$ 1,653.81	$ 1,665.41	$ 1,636.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	7263.4	7263.4	7340.7	7263.4	7392.3	7263.4	7263.4	7340.7	7392.3	7263.4
Net Present Value [$]	$ 6,030.89	$ 6,182.79	$ 6,246.6	$ 6,288.07	$ 6,324.16	$ 6,327.17	$ 6,330.59	$ 6,398.5	$ 6,475.88	$ 6,479.07
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	14.09	10.51	10.51	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 850.	$.

MEDIUM Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,309.63	$ 6,429.51	$ 6,530.37	$ 6,597.27	$ 6,624.56	$ 6,650.25	$ 6,744.44	$ 6,818.01	$ 6,845.3	$ 6,859.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,477.06	$ 9,657.12	$ 9,808.62	$ 9,909.1	$ 9,950.09	$ 9,988.68	$ 10,130.15	$ 10,240.65	$ 10,281.64	$ 10,303.16
Net Present Value [$]	$ 9,909.87	$ 8,927.47	$ 9,901.18	$ 8,081.82	$ 9,820.16	$ 8,920.48	$ 8,841.88	$ 8,075.8	$ 9,810.38	$ 9,770.43
Incremental dollars per GHG saving	$ 1.94	$ 2.1	$ 1.98	$ 2.26	$ 2.01	$ 2.14	$ 2.16	$ 2.3	$ 2.04	$ 2.05
Auxiliary Energy Required Heating [GJ/yr]	85.6	89.1	84.8	91.8	84.7	88.2	88.2	91	83.9	85.6
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.4	27.3	27.4	27.3	27.4	27.3	25.5
Annual Energy Space Heating [GJ/yr]	90.7	94.4	89.8	97.3	89.8	93.5	93.4	96.4	88.8	90.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	144.5	148.2	143.6	151.1	143.5	147.3	147.2	150.2	142.6	142.7
Design Heating Load [W]	12793.9	12793.9	12674	12895.7	12710.2	12674	12710.2	12775.8	12590.3	12793.9
Annual Energy Electricity [kWh/yr]	7790.8	7809.2	7786.2	7823.6	7786	7804.6	7804.4	7819	7781.5	7790.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,039.08	$ 1,041.69	$ 1,038.43	$ 1,043.72	$ 1,038.4	$ 1,041.04	$ 1,041.01	$ 1,043.07	$ 1,037.77	$ 1,039.08
Annual Energy Natural Gas [m3/yr]	3126.6	3223.9	3102.7	3300.4	3101.2	3199.8	3198	3276.2	3077.4	3077.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,348.71	$ 1,390.68	$ 1,338.4	$ 1,423.68	$ 1,337.75	$ 1,380.28	$ 1,379.51	$ 1,413.24	$ 1,327.48	$ 1,327.57
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169561	169507	169831	175825	171181	169777	171127	176095	171451	169562
Upgrade Package List	Pkg2121101031	Pkg2121101021	Pkg2121102031	Pkg2221101011	Pkg2131101031	Pkg2121102021	Pkg2131101021	Pkg2221102011	Pkg2131102031	Pkg2121101031
GHGI [kg/m2]	25.91	26.7	25.71	27.33	25.7	26.5	26.49	27.13	25.5	25.51
% ICC	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	101.5	105.6	100.5	108.8	100.4	104.6	104.5	107.8	99.4	101.5
Output: MEUI [kWh/(m2 * yr)]	140.9	145.2	139.8	148.7	139.7	144.1	144.1	147.6	138.6	138.7
Output: Better than ERS (%)	2350.0%	2150.0%	2390.0%	2000.0%	2400.0%	2200.0%	2200.0%	2040.0%	2450.0%	2440.0%
Output: Better than Envelope (%)	260.0%	140.0%	350.0%	440.0%	360.0%	30.0%	30.0%	350.0%	460.0%	260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	782	764	787	750	787	769	769	754	792	782
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 110.32	$ 107.72	$ 110.97	$ 105.69	$ 111.	$ 108.37	$ 108.4	$ 106.34	$ 111.63	$ 110.32
Annual savings in carbon tax for electricity [$/year]	$ .39	$ .38	$ .39	$ .37	$ .39	$ .38	$ .38	$ .38	$ .4	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 110.71	$ 108.11	$ 111.36	$ 106.07	$ 111.39	$ 108.76	$ 108.79	$ 106.72	$ 112.03	$ 110.71
Annual savings in GHG from electricity savings [kg CO2e/year]	8.6	8.4	8.7	8.2	8.7	8.5	8.5	8.3	8.7	8.6
Annual savings in natural gas [m3/year]	63.19	59.56	64.08	56.71	64.13	60.46	60.53	57.61	65.02	65.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 585.43	$ 551.84	$ 593.68	$ 525.43	$ 594.2	$ 560.16	$ 560.78	$ 533.79	$ 602.42	$ 602.35
Annual savings in carbon tax for natural gas [$/year]	$ 146.12	$ 137.74	$ 148.18	$ 131.15	$ 148.31	$ 139.81	$ 139.97	$ 133.23	$ 150.36	$ 150.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 731.55	$ 689.58	$ 741.86	$ 656.58	$ 742.51	$ 699.98	$ 700.75	$ 667.02	$ 752.78	$ 752.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	3247.1	3060.8	3292.9	2914.4	3295.8	3107	3110.4	2960.7	3341.3	3341
Net Present Value [$]	$ 9,909.87	$ 8,927.47	$ 9,901.18	$ 8,081.82	$ 9,820.16	$ 8,920.48	$ 8,841.88	$ 8,075.8	$ 9,810.38	$ 9,770.43
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,358.64	$ 1,238.76	$.	$ 1,238.76	$ 1,358.64	$ 1,358.64	$.	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 3,286.	$ 3,286.	$ 4,812.4	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 10,833.63	$ 9,180.37	$ 9,274.56	$ 10,059.63	$ 11,054.37	$ 10,095.3	$ 9,459.63	$ 11,148.56	$ 10,179.51	$ 9,495.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,272.11	$ 13,788.92	$ 13,930.39	$ 15,109.56	$ 16,603.66	$ 15,163.14	$ 14,208.36	$ 16,745.14	$ 15,289.62	$ 14,261.94
Net Present Value [$]	$ 17,535.29	$ 17,319.53	$ 17,387.68	$ 10,865.81	$ 17,416.06	$ 15,099.11	$ 13,008.91	$ 17,485.78	$ 11,852.42	$ 17,270.09
Incremental dollars per GHG saving	$ 1.2	$ 1.2	$ 1.21	$ 1.22	$ 1.22	$ 1.23	$ 1.23	$ 1.23	$ 1.24	$ 1.24
Auxiliary Energy Required Heating [GJ/yr]	92.7	94.9	94.8	85.8	91.9	94.2	85.5	91.9	89.3	94
Annual Energy DHW [GJ/yr]	9.5	27.4	27.4	16.5	9.5	16.5	27.4	9.5	16.5	27.4
Annual Energy Space Heating [GJ/yr]	59.8	62.5	62.5	55.7	59.3	61.5	56.1	59.3	57.4	62
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	96.7	117.5	117.5	99.8	96.2	105.6	111.1	96.2	101	117
Design Heating Load [W]	12901	14323.6	14359.7	12413.2	12781.1	13744.4	12901	12817.3	12413.2	14239.9
Annual Energy Electricity [kWh/yr]	26866.9	25032.5	25023.7	23136.8	26734.8	24767.3	23250	26725.3	23473.5	24892.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,738.35	$ 3,478.78	$ 3,477.54	$ 3,210.54	$ 3,719.66	$ 3,441.26	$ 3,226.56	$ 3,718.31	$ 3,258.19	$ 3,458.95
Annual Energy Natural Gas [m3/yr]	0	735.4	735	442.6	0	442.6	735.3	0	442.6	735
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 317.23	$ 317.05	$ 190.92	$.	$ 190.92	$ 317.18	$.	$ 190.92	$ 317.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169576	160120	161470	169573	169846	161743	169570	171196	169519	161740
Upgrade Package List	Pkg2121101031	Pkg1121102031	Pkg1131101031	Pkg2121101031	Pkg2121102031	Pkg1131102031	Pkg2121101031	Pkg2131101031	Pkg2121101021	Pkg1131102031
GHGI [kg/m2]	1.26	7.18	7.18	4.7	1.25	4.78	7.1	1.25	4.72	7.17
% ICC	2.1%	1.8%	1.8%	1.9%	2.1%	1.9%	1.8%	2.1%	1.9%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	109.9	112.4	112.4	101.6	108.9	111.6	101.3	108.9	105.9	111.4
Output: MEUI [kWh/(m2 * yr)]	84.1	108.7	108.7	87.7	83.5	94.7	101.1	83.5	89.2	108.1
Output: Better than ERS (%)	4560.0%	3580.0%	3580.0%	4320.0%	4580.0%	3990.0%	3930.0%	4580.0%	4250.0%	3610.0%
Output: Better than Envelope (%)	550.0%	800.0%	780.0%	240.0%	460.0%	720.0%	270.0%	460.0%	160.0%	690.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18294	16459	16450	14564	18162	16194	14677	18152	14900	16319
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,579.41	$ 2,320.76	$ 2,319.52	$ 2,053.47	$ 2,560.79	$ 2,283.37	$ 2,069.43	$ 2,559.45	$ 2,100.94	$ 2,300.99
Annual savings in carbon tax for electricity [$/year]	$ 9.15	$ 8.23	$ 8.23	$ 7.28	$ 9.08	$ 8.1	$ 7.34	$ 9.08	$ 7.45	$ 8.16
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,588.56	$ 2,328.99	$ 2,327.75	$ 2,060.75	$ 2,569.87	$ 2,291.47	$ 2,076.77	$ 2,568.52	$ 2,108.39	$ 2,309.15
Annual savings in GHG from electricity savings [kg CO2e/year]	201.2	181.1	181	160.2	199.8	178.1	161.4	199.7	163.9	179.5
Annual savings in natural gas [m3/year]	179.68	152.28	152.3	163.19	179.68	163.19	152.28	179.68	163.19	152.3
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,664.75	$ 1,410.88	$ 1,411.02	$ 1,511.96	$ 1,664.75	$ 1,511.96	$ 1,410.92	$ 1,664.75	$ 1,511.96	$ 1,411.02
Annual savings in carbon tax for natural gas [$/year]	$ 415.51	$ 352.15	$ 352.18	$ 377.38	$ 415.51	$ 377.38	$ 352.16	$ 415.51	$ 377.38	$ 352.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,080.26	$ 1,763.03	$ 1,763.21	$ 1,889.34	$ 2,080.26	$ 1,889.34	$ 1,763.08	$ 2,080.26	$ 1,889.34	$ 1,763.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	9233.6	7825.5	7826.3	8386.2	9233.6	8386.2	7825.7	9233.6	8386.2	7826.3
Net Present Value [$]	$ 17,535.29	$ 17,319.53	$ 17,387.68	$ 10,865.81	$ 17,416.06	$ 15,099.11	$ 13,008.91	$ 17,485.78	$ 11,852.42	$ 17,270.09
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,358.64	$ 1,238.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.	$ 3,286.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$.	$.	$ 600.	$ 1,374.	$ 600.	$.	$ 1,374.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 8,436.03	$ 8,656.77	$ 8,750.96	$ 8,971.7	$ 8,986.03	$ 9,206.77	$ 6,909.63	$ 7,130.37	$ 9,286.03	$ 9,506.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,670.92	$ 13,002.47	$ 13,143.94	$ 13,475.49	$ 13,497.02	$ 13,828.57	$ 10,378.26	$ 10,709.82	$ 13,947.62	$ 14,279.17
Net Present Value [$]	$ 11,886.73	$ 11,877.68	$ 11,791.8	$ 11,782.93	$ 11,683.54	$ 11,674.48	$ 11,671.41	$ 11,662.54	$ 11,614.53	$ 11,606.45
Incremental dollars per GHG saving	$ 2.02	$ 2.05	$ 2.07	$ 2.1	$ 2.11	$ 2.14	$ 1.82	$ 1.86	$ 2.16	$ 2.19
Auxiliary Energy Required Heating [GJ/yr]	78.9	78.1	78.1	77.2	79	78.1	86	85.1	79	78.1
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	14.9	16.5	16.5	13.9	13.9
Annual Energy Space Heating [GJ/yr]	83.6	82.7	82.7	81.8	83.6	82.7	91.1	90.2	83.6	82.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	126.5	125.6	125.6	124.7	125	124.1	134	133.1	123.9	123
Design Heating Load [W]	11620.1	11500.2	11536.4	11416.5	11620.1	11500.2	12307.5	12187.7	11620.1	11500.2
Annual Energy Electricity [kWh/yr]	7755.4	7750.9	7750.7	7746.2	7755.5	7751	7792.6	7788.1	7755.5	7751
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,034.07	$ 1,033.44	$ 1,033.41	$ 1,032.77	$ 1,034.09	$ 1,033.45	$ 1,039.34	$ 1,038.7	$ 1,034.09	$ 1,033.45
Annual Energy Natural Gas [m3/yr]	2647.6	2623.7	2622.8	2598.9	2606.2	2582.3	2844.1	2820.2	2578.6	2554.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,142.08	$ 1,131.77	$ 1,131.38	$ 1,121.07	$ 1,124.22	$ 1,113.91	$ 1,226.85	$ 1,216.54	$ 1,112.32	$ 1,101.97
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	175936	176206	179068	179338	175937	176207	169564	169834	175938	176208
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	21.99	21.8	21.79	21.59	21.65	21.46	23.6	23.4	21.43	21.23
% ICC	1.6%	1.7%	1.7%	1.7%	1.7%	1.8%	1.3%	1.4%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	93.6	92.5	92.5	91.5	93.6	92.6	101.9	100.9	93.6	92.6
Output: MEUI [kWh/(m2 * yr)]	119.6	118.5	118.4	117.4	117.7	116.7	128.4	127.3	116.5	115.4
Output: Better than ERS (%)	3020.0%	3070.0%	3070.0%	3120.0%	3110.0%	3150.0%	2610.0%	2660.0%	3170.0%	3220.0%
Output: Better than Envelope (%)	1020.0%	1110.0%	1110.0%	1220.0%	1010.0%	1110.0%	220.0%	320.0%	1010.0%	1110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	818	822	822	827	818	822	781	785	818	822
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 115.31	$ 115.94	$ 115.97	$ 116.61	$ 115.3	$ 115.93	$ 110.06	$ 110.7	$ 115.3	$ 115.93
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .39	$ .39	$ .41	$ .41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 115.72	$ 116.36	$ 116.38	$ 117.02	$ 115.7	$ 116.34	$ 110.45	$ 111.09	$ 115.7	$ 116.34
Annual savings in GHG from electricity savings [kg CO2e/year]	9	9	9	9.1	9	9	8.6	8.6	9	9
Annual savings in natural gas [m3/year]	81.03	81.92	81.96	82.85	82.58	83.47	73.71	74.6	83.61	84.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 750.78	$ 759.03	$ 759.35	$ 767.6	$ 765.08	$ 773.33	$ 682.95	$ 691.2	$ 774.6	$ 782.89
Annual savings in carbon tax for natural gas [$/year]	$ 187.39	$ 189.45	$ 189.53	$ 191.59	$ 190.96	$ 193.02	$ 170.46	$ 172.52	$ 193.34	$ 195.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 938.18	$ 948.49	$ 948.87	$ 959.18	$ 956.03	$ 966.34	$ 853.41	$ 863.72	$ 967.94	$ 978.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	4164.3	4210	4211.8	4257.5	4243.5	4289.3	3788	3833.8	4296.4	4342.3
Net Present Value [$]	$ 11,886.73	$ 11,877.68	$ 11,791.8	$ 11,782.93	$ 11,683.54	$ 11,674.48	$ 11,671.41	$ 11,662.54	$ 11,614.53	$ 11,606.45
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 3,286.	$ 3,286.	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

MEDIUM Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,786.03	$ 13,006.77	$ 13,100.96	$ 13,321.7	$ 13,336.03	$ 13,556.77	$ 13,606.77	$ 13,636.03	$ 13,650.96	$ 13,700.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,204.62	$ 19,536.17	$ 19,677.64	$ 20,009.19	$ 20,030.72	$ 20,362.27	$ 20,437.37	$ 20,481.32	$ 20,503.74	$ 20,578.84
Net Present Value [$]	$ 12,152.32	$ 12,033.15	$ 12,104.04	$ 11,948.1	$ 12,292.01	$ 12,172.59	$ 9,816.	$ 12,318.06	$ 12,243.48	$ 9,943.97
Incremental dollars per GHG saving	$ 1.67	$ 1.69	$ 1.71	$ 1.73	$ 1.72	$ 1.74	$ 1.65	$ 1.74	$ 1.76	$ 1.66
Auxiliary Energy Required Heating [GJ/yr]	73.8	73	72.9	72.1	73.8	73	73.2	73.8	72.9	73.2
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.4	25.6	25.6	16.5	24.4	25.6	16.5
Annual Energy Space Heating [GJ/yr]	49.3	48.8	48.8	48.2	49.3	48.8	48.3	49.3	48.8	48.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	105.3	104.8	104.7	104.2	103.4	103	93.3	102.2	102.9	93.4
Design Heating Load [W]	11052.8	10932.9	10969.1	10849.2	11052.8	10932.9	10445.1	11052.8	10969.1	10481.3
Annual Energy Electricity [kWh/yr]	21622.3	21489.9	21482.4	21335.8	21622.3	21489.9	21351.2	21622.3	21482.4	21364.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,996.24	$ 2,977.51	$ 2,976.44	$ 2,955.7	$ 2,996.24	$ 2,977.51	$ 2,957.88	$ 2,996.24	$ 2,976.44	$ 2,959.73
Annual Energy Natural Gas [m3/yr]	736.2	736.3	735.8	735.9	687.2	687.3	442.6	654.5	686.8	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 317.57	$ 317.61	$ 317.4	$ 317.44	$ 296.43	$ 296.48	$ 190.92	$ 282.33	$ 296.26	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175978	176248	179110	179380	175979	176249	176251	175980	179111	179113
Upgrade Package List	Pkg2221101033	Pkg2221102033	Pkg2231101033	Pkg2231102033	Pkg2221101033	Pkg2221102033	Pkg2221102033	Pkg2221101033	Pkg2231101033	Pkg2231101033
GHGI [kg/m2]	7.03	7.02	7.02	7.01	6.63	6.62	4.62	6.36	6.62	4.62
% ICC	2.4%	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	87.5	86.5	86.4	85.4	87.5	86.5	86.8	87.5	86.4	86.8
Output: MEUI [kWh/(m2 * yr)]	94.2	93.6	93.6	93	92	91.5	80.1	90.6	91.4	80.1
Output: Better than ERS (%)	4250.0%	4280.0%	4280.0%	4310.0%	4350.0%	4370.0%	4690.0%	4420.0%	4380.0%	4680.0%
Output: Better than Envelope (%)	1600.0%	1700.0%	1710.0%	1800.0%	1600.0%	1700.0%	1670.0%	1600.0%	1710.0%	1670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13049	12917	12909	12763	13049	12917	12778	13049	12909	12791
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,839.92	$ 1,821.25	$ 1,820.2	$ 1,799.53	$ 1,839.92	$ 1,821.25	$ 1,801.7	$ 1,839.92	$ 1,820.2	$ 1,803.55
Annual savings in carbon tax for electricity [$/year]	$ 6.52	$ 6.46	$ 6.45	$ 6.38	$ 6.52	$ 6.46	$ 6.39	$ 6.52	$ 6.45	$ 6.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,846.45	$ 1,827.71	$ 1,826.65	$ 1,805.91	$ 1,846.45	$ 1,827.71	$ 1,808.09	$ 1,846.45	$ 1,826.65	$ 1,809.94
Annual savings in GHG from electricity savings [kg CO2e/year]	143.5	142.1	142	140.4	143.5	142.1	140.6	143.5	142	140.7
Annual savings in natural gas [m3/year]	152.25	152.25	152.27	152.26	154.08	154.07	163.19	155.3	154.09	163.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,410.61	$ 1,410.57	$ 1,410.74	$ 1,410.71	$ 1,427.52	$ 1,427.49	$ 1,511.96	$ 1,438.81	$ 1,427.66	$ 1,511.96
Annual savings in carbon tax for natural gas [$/year]	$ 352.08	$ 352.07	$ 352.12	$ 352.11	$ 356.3	$ 356.29	$ 377.38	$ 359.12	$ 356.34	$ 377.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,762.69	$ 1,762.64	$ 1,762.86	$ 1,762.82	$ 1,783.82	$ 1,783.78	$ 1,889.34	$ 1,797.93	$ 1,784.	$ 1,889.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	7824	7823.8	7824.8	7824.6	7917.8	7917.6	8386.2	7980.4	7918.6	8386.2
Net Present Value [$]	$ 12,152.32	$ 12,033.15	$ 12,104.04	$ 11,948.1	$ 12,292.01	$ 12,172.59	$ 9,816.	$ 12,318.06	$ 12,243.48	$ 9,943.97
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 550.	$.

MEDIUM Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,606.77	$ 13,700.96	$ 12,786.03	$ 13,921.7	$ 13,006.77	$ 14,156.77	$ 13,100.96	$ 14,250.96	$ 13,336.03	$ 14,456.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,437.37	$ 20,578.84	$ 19,204.62	$ 20,910.39	$ 19,536.17	$ 21,263.47	$ 19,677.64	$ 21,404.94	$ 20,030.72	$ 21,714.07
Net Present Value [$]	$ 9,816.	$ 9,943.97	$ 12,152.32	$ 9,780.19	$ 12,033.15	$ 10,020.25	$ 12,104.04	$ 10,148.22	$ 12,292.01	$ 10,090.6
Incremental dollars per GHG saving	$ 1.65	$ 1.66	$ 1.67	$ 1.69	$ 1.69	$ 1.7	$ 1.71	$ 1.71	$ 1.72	$ 1.73
Auxiliary Energy Required Heating [GJ/yr]	73.2	73.2	73.8	72.4	73	73.2	72.9	73.2	73.8	73.2
Annual Energy DHW [GJ/yr]	16.5	16.5	27.4	16.5	27.4	14.9	27.4	14.9	25.6	13.9
Annual Energy Space Heating [GJ/yr]	48.3	48.3	49.3	47.8	48.8	48.3	48.8	48.4	49.3	48.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	93.3	93.4	105.3	92.9	104.8	91.8	104.7	91.8	103.4	90.8
Design Heating Load [W]	10445.1	10481.3	11052.8	10361.4	10932.9	10445.1	10969.1	10481.3	11052.8	10445.1
Annual Energy Electricity [kWh/yr]	21351.2	21364.3	21622.3	21215	21489.9	21353.2	21482.4	21366.3	21622.3	21354.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,957.88	$ 2,959.73	$ 2,996.24	$ 2,938.61	$ 2,977.51	$ 2,958.16	$ 2,976.44	$ 2,960.02	$ 2,996.24	$ 2,958.35
Annual Energy Natural Gas [m3/yr]	442.6	442.6	736.2	442.6	736.3	400.7	735.8	400.7	687.2	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 317.57	$ 190.92	$ 317.61	$ 172.85	$ 317.4	$ 172.85	$ 296.43	$ 160.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	176251	179113	175978	179383	176248	176252	179110	179114	175979	176253
Upgrade Package List	Pkg2221102033	Pkg2231101033	Pkg2221101033	Pkg2231102033	Pkg2221102033	Pkg2221102033	Pkg2231101033	Pkg2231101033	Pkg2221101033	Pkg2221102033
GHGI [kg/m2]	4.62	4.62	7.03	4.61	7.02	4.28	7.02	4.28	6.63	4.05
% ICC	2.6%	2.6%	2.4%	2.7%	2.5%	2.7%	2.5%	2.7%	2.6%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	86.8	86.8	87.5	85.7	86.5	86.8	86.4	86.8	87.5	86.8
Output: MEUI [kWh/(m2 * yr)]	80.1	80.1	94.2	79.5	93.6	78.2	93.6	78.3	92	77
Output: Better than ERS (%)	4690.0%	4680.0%	4250.0%	4710.0%	4280.0%	4770.0%	4280.0%	4770.0%	4350.0%	4830.0%
Output: Better than Envelope (%)	1670.0%	1670.0%	1600.0%	1760.0%	1700.0%	1670.0%	1710.0%	1670.0%	1600.0%	1670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12778	12791	13049	12642	12917	12780	12909	12793	13049	12781
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,801.7	$ 1,803.55	$ 1,839.92	$ 1,782.49	$ 1,821.25	$ 1,801.98	$ 1,820.2	$ 1,803.83	$ 1,839.92	$ 1,802.16
Annual savings in carbon tax for electricity [$/year]	$ 6.39	$ 6.4	$ 6.52	$ 6.32	$ 6.46	$ 6.39	$ 6.45	$ 6.4	$ 6.52	$ 6.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,808.09	$ 1,809.94	$ 1,846.45	$ 1,788.81	$ 1,827.71	$ 1,808.37	$ 1,826.65	$ 1,810.22	$ 1,846.45	$ 1,808.55
Annual savings in GHG from electricity savings [kg CO2e/year]	140.6	140.7	143.5	139.1	142.1	140.6	142	140.7	143.5	140.6
Annual savings in natural gas [m3/year]	163.19	163.19	152.25	163.19	152.25	164.75	152.27	164.75	154.08	165.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,511.96	$ 1,511.96	$ 1,410.61	$ 1,511.96	$ 1,410.57	$ 1,526.42	$ 1,410.74	$ 1,526.42	$ 1,427.52	$ 1,536.02
Annual savings in carbon tax for natural gas [$/year]	$ 377.38	$ 377.38	$ 352.08	$ 377.38	$ 352.07	$ 380.99	$ 352.12	$ 380.99	$ 356.3	$ 383.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,889.34	$ 1,889.34	$ 1,762.69	$ 1,889.34	$ 1,762.64	$ 1,907.41	$ 1,762.86	$ 1,907.41	$ 1,783.82	$ 1,919.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	8386.2	8386.2	7824	8386.2	7823.8	8466.4	7824.8	8466.4	7917.8	8519.6
Net Present Value [$]	$ 9,816.	$ 9,943.97	$ 12,152.32	$ 9,780.19	$ 12,033.15	$ 10,020.25	$ 12,104.04	$ 10,148.22	$ 12,292.01	$ 10,090.6
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4	$ 4,812.4
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.	$ 850.

MEDIUM Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,981.08	$ 13,931.08	$ 14,060.34	$ 14,281.08	$ 14,075.27	$ 14,025.27	$ 14,296.01	$ 14,246.01	$ 14,067.83	$ 14,375.27
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,999.58	$ 20,924.48	$ 21,118.63	$ 21,450.18	$ 21,141.06	$ 21,065.96	$ 21,472.61	$ 21,397.51	$ 21,129.88	$ 21,591.66
Net Present Value [$]	$ 9,838.15	$ 9,832.33	$ 9,779.17	$ 9,769.39	$ 9,747.72	$ 9,739.84	$ 9,736.97	$ 9,728.12	$ 9,679.81	$ 9,678.35
Incremental dollars per GHG saving	$ 2.76	$ 2.76	$ 2.77	$ 2.79	$ 2.78	$ 2.77	$ 2.79	$ 2.79	$ 2.78	$ 2.81
Auxiliary Energy Required Heating [GJ/yr]	63.6	62.4	64.5	63.6	63.6	62.4	62.7	61.6	62.5	63.6
Annual Energy DHW [GJ/yr]	14.9	16.5	13.9	13.9	14.9	16.5	14.9	16.5	16.5	13.9
Annual Energy Space Heating [GJ/yr]	67.4	66.1	68.3	67.4	67.4	66.1	66.5	65.2	66.2	67.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	109.6	109.9	109.5	108.6	109.6	109.9	108.7	109	110	108.6
Design Heating Load [W]	9104.5	9054	9224.3	9104.5	9140.6	9090.2	9020.8	8970.3	9033.9	9140.6
Annual Energy Electricity [kWh/yr]	7927.8	7921.5	7932.3	7927.8	7927.7	7921.5	7923.2	7917	7921.8	7927.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,058.47	$ 1,057.58	$ 1,059.11	$ 1,058.47	$ 1,058.45	$ 1,057.58	$ 1,057.82	$ 1,056.94	$ 1,057.62	$ 1,058.47
Annual Energy Natural Gas [m3/yr]	2177.2	2185.8	2173.4	2149.6	2176.8	2185.6	2153.1	2162	2187.6	2149.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 939.17	$ 942.88	$ 937.53	$ 927.26	$ 939.	$ 942.79	$ 928.77	$ 932.61	$ 943.65	$ 927.09
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	201767	201784	201552	201768	203495	203512	203711	203728	201982	203496
Upgrade Package List	Pkg3321202033	Pkg3321202034	Pkg3321201033	Pkg3321202033	Pkg3331201033	Pkg3331201034	Pkg3331202033	Pkg3331202034	Pkg3321203033	Pkg3331201033
GHGI [kg/m2]	18.16	18.23	18.13	17.93	18.15	18.22	17.96	18.03	18.24	17.93
% ICC	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.4	74	76.4	75.4	75.4	74	74.3	72.9	74	75.4
Output: MEUI [kWh/(m2 * yr)]	99.5	99.9	99.4	98.3	99.5	99.9	98.5	98.8	100	98.3
Output: Better than ERS (%)	3950.0%	3940.0%	3960.0%	4010.0%	3950.0%	3940.0%	4000.0%	3990.0%	3930.0%	4010.0%
Output: Better than Envelope (%)	2760.0%	2900.0%	2660.0%	2760.0%	2760.0%	2900.0%	2870.0%	2990.0%	2890.0%	2760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	645	652	641	645	646	652	650	656	651	645
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 91.	$ 91.89	$ 90.37	$ 91.	$ 91.02	$ 91.89	$ 91.65	$ 92.52	$ 91.85	$ 91.
Annual savings in carbon tax for electricity [$/year]	$ .32	$ .33	$ .32	$ .32	$ .32	$ .33	$ .32	$ .33	$ .33	$ .32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 91.32	$ 92.22	$ 90.69	$ 91.32	$ 91.34	$ 92.22	$ 91.98	$ 92.85	$ 92.17	$ 91.32
Annual savings in GHG from electricity savings [kg CO2e/year]	7.1	7.2	7	7.1	7.1	7.2	7.2	7.2	7.2	7.1
Annual savings in natural gas [m3/year]	98.56	98.24	98.7	99.59	98.58	98.25	99.46	99.13	98.17	99.6
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 913.17	$ 910.2	$ 914.48	$ 922.7	$ 913.31	$ 910.27	$ 921.49	$ 918.41	$ 909.58	$ 922.83
Annual savings in carbon tax for natural gas [$/year]	$ 227.92	$ 227.18	$ 228.25	$ 230.3	$ 227.96	$ 227.2	$ 230.	$ 229.23	$ 227.03	$ 230.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,141.09	$ 1,137.38	$ 1,142.73	$ 1,153.	$ 1,141.26	$ 1,137.47	$ 1,151.49	$ 1,147.65	$ 1,136.6	$ 1,153.17
Annual savings in GHG from natural gas savings [kg CO2e/year]	5064.9	5048.5	5072.2	5117.8	5065.7	5048.9	5111.1	5094	5045	5118.6
Net Present Value [$]	$ 9,838.15	$ 9,832.33	$ 9,779.17	$ 9,769.39	$ 9,747.72	$ 9,739.84	$ 9,736.97	$ 9,728.12	$ 9,679.81	$ 9,678.35
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	8.78	8.78	10.51	10.51	14.09	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 1,163.13	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76	$ 1,238.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 850.	$ 550.	$.	$ 550.	$.	$.	$ 850.

MEDIUM Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,673.96	$ 21,859.03	$ 21,953.22	$ 21,995.78	$ 22,117.24	$ 22,134.84	$ 22,173.96	$ 22,188.29	$ 22,195.61	$ 22,223.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 32,554.29	$ 32,832.26	$ 32,973.74	$ 33,037.66	$ 33,220.09	$ 33,246.53	$ 33,305.29	$ 33,326.81	$ 33,337.81	$ 33,380.39
Net Present Value [$]	$ 12,423.58	$ 12,651.41	$ 12,725.89	$ 12,660.97	$ 12,767.97	$ 12,884.46	$ 12,616.03	$ 12,901.69	$ 13,029.1	$ 12,563.02
Incremental dollars per GHG saving	$ 2.81	$ 2.83	$ 2.85	$ 2.85	$ 2.87	$ 2.87	$ 2.87	$ 2.84	$ 2.88	$ 2.85
Auxiliary Energy Required Heating [GJ/yr]	54.3	54	54	54	54.7	54.3	53.1	54.8	54.5	54.3
Annual Energy DHW [GJ/yr]	27.4	27.5	27.4	27.4	27.4	27.4	27.4	25.6	27.4	25.6
Annual Energy Space Heating [GJ/yr]	37.1	37.1	37.1	36.9	37	37.1	36.6	37.6	37.2	37.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	93.2	93.3	93.3	93.1	93.1	93.2	92.8	91.9	93.3	91.4
Design Heating Load [W]	8799.2	8832.4	8868.6	8812.4	8611.7	8799.2	8748.7	8952.3	8860.9	8799.2
Annual Energy Electricity [kWh/yr]	18274.9	18288.6	18282.9	18240.5	18237.8	18274.9	18154.1	18417.7	18308.8	18274.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,522.58	$ 2,524.52	$ 2,523.72	$ 2,517.72	$ 2,517.33	$ 2,522.58	$ 2,505.49	$ 2,542.79	$ 2,527.38	$ 2,522.58
Annual Energy Natural Gas [m3/yr]	736.3	737.2	736.6	736.8	735.9	736.3	736.7	688.1	735.9	687.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 317.61	$ 318.	$ 317.74	$ 317.83	$ 317.44	$ 317.61	$ 317.79	$ 296.82	$ 317.44	$ 296.48
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	203824	201898	203626	202096	208018	204472	203842	201683	205552	203825
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg3331201054	Pkg3321203053	Pkg4231302053	Pkg3331302053	Pkg3321202054	Pkg3321201054	Pkg3341201053	Pkg3331202053
GHGI [kg/m2]	6.87	6.88	6.87	6.87	6.87	6.87	6.87	6.49	6.87	6.47
% ICC	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	64.3	64	64	64	64.8	64.3	63	64.9	64.6	64.3
Output: MEUI [kWh/(m2 * yr)]	79.9	80	79.9	79.8	79.7	79.9	79.4	78.4	80	77.7
Output: Better than ERS (%)	4910.0%	4900.0%	4900.0%	4920.0%	4920.0%	4910.0%	4930.0%	4980.0%	4900.0%	5010.0%
Output: Better than Envelope (%)	3820.0%	3860.0%	3860.0%	3860.0%	3780.0%	3820.0%	3960.0%	3770.0%	3800.0%	3820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9702	9715	9710	9667	9665	9702	9581	9844	9736	9702
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,367.94	$ 1,369.87	$ 1,369.07	$ 1,363.09	$ 1,362.71	$ 1,367.94	$ 1,350.91	$ 1,388.07	$ 1,372.72	$ 1,367.94
Annual savings in carbon tax for electricity [$/year]	$ 4.85	$ 4.86	$ 4.85	$ 4.83	$ 4.83	$ 4.85	$ 4.79	$ 4.92	$ 4.87	$ 4.85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,372.79	$ 1,374.73	$ 1,373.92	$ 1,367.92	$ 1,367.54	$ 1,372.79	$ 1,355.7	$ 1,393.	$ 1,377.59	$ 1,372.79
Annual savings in GHG from electricity savings [kg CO2e/year]	106.7	106.9	106.8	106.3	106.3	106.7	105.4	108.3	107.1	106.7
Annual savings in natural gas [m3/year]	152.25	152.21	152.24	152.23	152.26	152.25	152.23	154.04	152.26	154.07
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,410.57	$ 1,410.26	$ 1,410.47	$ 1,410.4	$ 1,410.71	$ 1,410.57	$ 1,410.43	$ 1,427.21	$ 1,410.71	$ 1,427.49
Annual savings in carbon tax for natural gas [$/year]	$ 352.07	$ 351.99	$ 352.05	$ 352.03	$ 352.11	$ 352.07	$ 352.04	$ 356.23	$ 352.11	$ 356.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,762.64	$ 1,762.26	$ 1,762.51	$ 1,762.43	$ 1,762.82	$ 1,762.64	$ 1,762.47	$ 1,783.44	$ 1,762.82	$ 1,783.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	7823.8	7822.1	7823.3	7822.9	7824.6	7823.8	7823.1	7916.1	7824.6	7917.6
Net Present Value [$]	$ 12,423.58	$ 12,651.41	$ 12,725.89	$ 12,660.97	$ 12,767.97	$ 12,884.46	$ 12,616.03	$ 12,901.69	$ 13,029.1	$ 12,563.02
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	14.09	10.51	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 4,812.4	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.

MEDIUM Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,273.96	$ 22,459.03	$ 22,553.22	$ 22,595.78	$ 22,823.96	$ 22,734.84	$ 23,123.96	$ 22,773.96	$ 23,009.03	$ 22,795.61
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,455.49	$ 33,733.46	$ 33,874.94	$ 33,938.86	$ 34,281.59	$ 34,147.73	$ 34,732.19	$ 34,206.49	$ 34,559.56	$ 34,239.01
Net Present Value [$]	$ 10,294.44	$ 10,510.55	$ 10,597.62	$ 10,531.91	$ 10,498.69	$ 10,755.32	$ 10,569.03	$ 10,473.64	$ 10,714.61	$ 10,912.86
Incremental dollars per GHG saving	$ 2.69	$ 2.71	$ 2.72	$ 2.73	$ 2.73	$ 2.75	$ 2.75	$ 2.75	$ 2.75	$ 2.75
Auxiliary Energy Required Heating [GJ/yr]	54.6	54.2	54.3	54.3	54.6	54.6	54.6	53.4	54.3	54.8
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	13.9	16.5	14.9	16.5
Annual Energy Space Heating [GJ/yr]	36.7	36.8	36.7	36.6	36.7	36.7	36.7	36.3	36.8	36.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	81.9	81.9	81.9	81.8	80.3	81.9	79.3	81.4	80.4	82
Design Heating Load [W]	8330.3	8363.5	8399.7	8343.4	8330.3	8330.3	8330.3	8279.8	8363.5	8392
Annual Energy Electricity [kWh/yr]	18170.4	18182.5	18179.7	18137.7	18172.4	18170.4	18173.7	18045.8	18184.4	18208
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,507.8	$ 2,509.51	$ 2,509.11	$ 2,503.17	$ 2,508.08	$ 2,507.8	$ 2,508.26	$ 2,490.17	$ 2,509.78	$ 2,513.12
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	400.7	442.6	372.9	442.6	400.7	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 190.92	$ 172.85	$ 190.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	203827	201901	203629	202099	203828	204475	203829	203845	201902	205555
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg3331201054	Pkg3321203053	Pkg3331202053	Pkg3331302053	Pkg3331202053	Pkg3331202054	Pkg3321202054	Pkg3341201053
GHGI [kg/m2]	4.47	4.47	4.47	4.47	4.13	4.47	3.9	4.46	4.13	4.47
% ICC	4.3%	4.3%	4.3%	4.3%	4.4%	4.3%	4.4%	4.4%	4.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	64.7	64.3	64.3	64.3	64.7	64.7	64.7	63.3	64.3	65
Output: MEUI [kWh/(m2 * yr)]	66.5	66.5	66.5	66.3	64.6	66.5	63.4	65.9	64.7	66.6
Output: Better than ERS (%)	5340.0%	5340.0%	5340.0%	5340.0%	5430.0%	5340.0%	5480.0%	5360.0%	5420.0%	5330.0%
Output: Better than Envelope (%)	3790.0%	3830.0%	3820.0%	3820.0%	3790.0%	3790.0%	3790.0%	3920.0%	3820.0%	3770.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9597	9609	9606	9564	9599	9597	9600	9473	9611	9635
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,353.21	$ 1,354.91	$ 1,354.52	$ 1,348.59	$ 1,353.49	$ 1,353.21	$ 1,353.67	$ 1,335.64	$ 1,355.18	$ 1,358.51
Annual savings in carbon tax for electricity [$/year]	$ 4.8	$ 4.8	$ 4.8	$ 4.78	$ 4.8	$ 4.8	$ 4.8	$ 4.74	$ 4.81	$ 4.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,358.	$ 1,359.72	$ 1,359.32	$ 1,353.38	$ 1,358.29	$ 1,358.	$ 1,358.47	$ 1,340.37	$ 1,359.98	$ 1,363.32
Annual savings in GHG from electricity savings [kg CO2e/year]	105.6	105.7	105.7	105.2	105.6	105.6	105.6	104.2	105.7	106
Annual savings in natural gas [m3/year]	163.19	163.19	163.19	163.19	164.75	163.19	165.79	163.19	164.75	163.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,511.96	$ 1,511.96	$ 1,511.96	$ 1,511.96	$ 1,526.42	$ 1,511.96	$ 1,536.02	$ 1,511.96	$ 1,526.42	$ 1,511.96
Annual savings in carbon tax for natural gas [$/year]	$ 377.38	$ 377.38	$ 377.38	$ 377.38	$ 380.99	$ 377.38	$ 383.38	$ 377.38	$ 380.99	$ 377.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,889.34	$ 1,889.34	$ 1,889.34	$ 1,889.34	$ 1,907.41	$ 1,889.34	$ 1,919.4	$ 1,889.34	$ 1,907.41	$ 1,889.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	8386.2	8386.2	8386.2	8386.2	8466.4	8386.2	8519.6	8386.2	8466.4	8386.2
Net Present Value [$]	$ 10,294.44	$ 10,510.55	$ 10,597.62	$ 10,531.91	$ 10,498.69	$ 10,755.32	$ 10,569.03	$ 10,473.64	$ 10,714.61	$ 10,912.86
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	14.09	10.51	10.51	10.51	10.51	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.

MEDIUM Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k	medium.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 23,734.84	$ 23,419.91	$ 24,234.84	$ 24,284.84	$ 24,371.59	$ 23,919.91	$ 24,584.84	$ 23,969.91	$ 24,056.66	$ 24,031.12
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,649.73	$ 35,176.7	$ 36,400.73	$ 36,475.83	$ 36,606.13	$ 35,927.7	$ 36,926.43	$ 36,002.8	$ 36,133.1	$ 36,094.74
Net Present Value [$]	$ 9,804.76	$ 9,888.24	$ 9,987.98	$ 10,008.83	$ 10,019.38	$ 10,061.77	$ 10,079.17	$ 10,092.12	$ 10,097.55	$ 10,101.04
Incremental dollars per GHG saving	$ 2.86	$ 2.83	$ 2.92	$ 2.9	$ 2.94	$ 2.89	$ 2.92	$ 2.87	$ 2.9	$ 2.9
Auxiliary Energy Required Heating [GJ/yr]	50.6	51.5	49.5	50.7	49.6	50.3	50.7	51.5	50.4	50.6
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	16.5	16.5	13.9	14.9	16.5	16.5
Annual Energy Space Heating [GJ/yr]	34	34.5	33.5	34	33.4	34.1	34	34.5	33.9	34
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	79.2	79.7	78.7	77.6	78.6	79.3	76.6	78.2	79.1	79.2
Design Heating Load [W]	7718.7	7802.4	7668.2	7718.7	7648.2	7752	7718.7	7802.4	7731.9	7718.7
Annual Energy Electricity [kWh/yr]	17412.8	17567.5	17289.7	17414.7	17248.8	17440.7	17416	17569.4	17401.5	17412.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,400.6	$ 2,422.49	$ 2,383.18	$ 2,400.87	$ 2,377.39	$ 2,404.54	$ 2,401.05	$ 2,422.76	$ 2,399.	$ 2,400.6
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	400.7	442.6	442.6	372.9	400.7	442.6	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 190.92	$ 160.86	$ 172.85	$ 190.92	$ 190.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	209749	209173	209767	209750	209893	209191	209751	209174	209317	210037
Upgrade Package List	Pkg4331302053	Pkg4321302053	Pkg4331302054	Pkg4331302053	Pkg4331303053	Pkg4321302054	Pkg4331302053	Pkg4321302053	Pkg4321303053	Pkg4331402053
GHGI [kg/m2]	4.43	4.44	4.43	4.09	4.42	4.43	3.86	4.1	4.43	4.43
% ICC	4.5%	4.5%	4.6%	4.6%	4.7%	4.6%	4.7%	4.6%	4.6%	4.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	60	61	58.7	60	58.7	59.6	60	61	59.7	60
Output: MEUI [kWh/(m2 * yr)]	63.2	63.9	62.7	61.4	62.6	63.4	60.2	62.1	63.2	63.2
Output: Better than ERS (%)	5490.0%	5460.0%	5520.0%	5580.0%	5520.0%	5480.0%	5640.0%	5550.0%	5500.0%	5490.0%
Output: Better than Envelope (%)	4240.0%	4140.0%	4370.0%	4230.0%	4360.0%	4280.0%	4230.0%	4140.0%	4270.0%	4240.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8840	8994	8716	8842	8676	8868	8843	8996	8828	8840
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,246.38	$ 1,268.2	$ 1,229.03	$ 1,246.65	$ 1,223.26	$ 1,250.32	$ 1,246.83	$ 1,268.46	$ 1,244.79	$ 1,246.38
Annual savings in carbon tax for electricity [$/year]	$ 4.42	$ 4.5	$ 4.36	$ 4.42	$ 4.34	$ 4.43	$ 4.42	$ 4.5	$ 4.41	$ 4.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,250.8	$ 1,272.69	$ 1,233.38	$ 1,251.07	$ 1,227.6	$ 1,254.75	$ 1,251.26	$ 1,272.96	$ 1,249.2	$ 1,250.8
Annual savings in GHG from electricity savings [kg CO2e/year]	97.2	98.9	95.9	97.3	95.4	97.5	97.3	99	97.1	97.2
Annual savings in natural gas [m3/year]	163.19	163.19	163.19	164.75	163.19	163.19	165.79	164.75	163.19	163.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,511.96	$ 1,511.96	$ 1,511.96	$ 1,526.42	$ 1,511.96	$ 1,511.96	$ 1,536.02	$ 1,526.42	$ 1,511.96	$ 1,511.96
Annual savings in carbon tax for natural gas [$/year]	$ 377.38	$ 377.38	$ 377.38	$ 380.99	$ 377.38	$ 377.38	$ 383.38	$ 380.99	$ 377.38	$ 377.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,889.34	$ 1,889.34	$ 1,889.34	$ 1,907.41	$ 1,889.34	$ 1,889.34	$ 1,919.4	$ 1,907.41	$ 1,889.34	$ 1,889.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	8386.2	8386.2	8386.2	8466.4	8386.2	8386.2	8519.6	8466.4	8386.2	8386.2
Net Present Value [$]	$ 9,804.76	$ 9,888.24	$ 9,987.98	$ 10,008.83	$ 10,019.38	$ 10,061.77	$ 10,079.17	$ 10,092.12	$ 10,097.55	$ 10,101.04
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	14.09	10.51	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71	$ 6,616.71
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.	$ 5,830.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.

MEDIUM 018WWR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 6,084.47	$ 6,305.21	$ 6,308.47	$ 6,384.47	$ 6,399.4	$ 6,529.21	$ 6,600.59	$ 6,605.21	$ 6,620.14	$ 6,623.4
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,084.47	$ 6,305.21	$ 6,308.47	$ 6,384.47	$ 6,399.4	$ 6,529.21	$ 6,600.59	$ 6,605.21	$ 6,620.14	$ 6,623.4
Net Present Value [$]	$ 23.97	$ 115.47	$ 3,831.5	$ 120.44	$ 191.82	$ 3,969.54	$ 568.69	$ 259.69	$ 331.02	$ 4,045.4
Incremental dollars per GHG saving	$ 5.46	$ 5.57	$ 4.08	$ 5.55	$ 5.63	$ 4.17	$ 4.92	$ 5.66	$ 5.74	$ 4.22
Auxiliary Energy Required Heating [GJ/yr]	27.3	27	30.7	27.3	26.9	30.3	22	27	26.6	30.3
Annual Energy DHW [GJ/yr]	12.4	12.4	7.8	11.7	12.4	7.8	13.5	11.7	12.4	7.8
Annual Energy Space Heating [GJ/yr]	28.9	28.6	32.5	28.9	28.5	32.1	23.3	28.6	28.1	32
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.7	67.3	66.7	67	67.3	66.3	63.2	66.6	66.9	66.2
Design Heating Load [W]	6000.9	5946.6	6121.3	6000.9	5954.8	6067	5923.4	5946.6	5900.5	6075.1
Annual Energy Electricity [kWh/yr]	7469.4	7467.7	9657.6	7469.5	7467.3	9656.1	7441.6	7467.7	7465.6	9654.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.61	$ 993.36	$ 1,303.24	$ 993.62	$ 993.31	$ 1,303.02	$ 989.67	$ 993.36	$ 993.07	$ 1,302.84
Annual Energy Natural Gas [m3/yr]	1095.3	1086.1	856.3	1076.7	1084.1	846.9	977.2	1067.5	1074.9	845.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 472.47	$ 468.51	$ 369.38	$ 464.45	$ 467.64	$ 365.32	$ 421.53	$ 460.48	$ 463.67	$ 364.55
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11345	11615	11347	11346	12965	11617	1732	11616	13235	12967
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2121101011	Pkg2121101011	Pkg2131101011	Pkg2121102011	Pkg1121101031	Pkg2121102011	Pkg2131102011	Pkg2131101011
GHGI [kg/m2]	9.3	9.22	7.45	9.15	9.21	7.37	8.33	9.07	9.13	7.36
% ICC	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.3	32	36.3	32.3	31.9	35.9	26.1	32	31.5	35.9
Output: MEUI [kWh/(m2 * yr)]	49.8	49.4	48.6	49	49.3	48.2	44.5	48.6	48.9	48.1
Output: Better than ERS (%)	1090.0%	1140.0%	1210.0%	1180.0%	1140.0%	1260.0%	1680.0%	1240.0%	1200.0%	1280.0%
Output: Better than Envelope (%)	1050.0%	930.0%	2430.0%	1050.0%	890.0%	2270.0%	1090.0%	930.0%	770.0%	2270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	488	490	1700	488	490	1699	516	490	492	1698
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 68.79	$ 69.03	$ 239.74	$ 68.78	$ 69.09	$ 239.53	$ 72.71	$ 69.03	$ 69.33	$ 239.35
Annual savings in carbon tax for electricity [$/year]	$ .24	$ .24	$ .85	$ .24	$ .24	$ .85	$ .26	$ .24	$ .25	$ .85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 69.04	$ 69.28	$ 240.59	$ 69.02	$ 69.33	$ 240.38	$ 72.97	$ 69.28	$ 69.58	$ 240.2
Annual savings in GHG from electricity savings [kg CO2e/year]	5.4	5.4	18.7	5.4	5.4	18.7	5.7	5.4	5.4	18.7
Annual savings in natural gas [m3/year]	21.58	21.93	30.49	22.28	22	30.84	25.98	22.62	22.34	30.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 199.98	$ 203.15	$ 282.48	$ 206.4	$ 203.84	$ 285.73	$ 240.75	$ 209.57	$ 207.02	$ 286.35
Annual savings in carbon tax for natural gas [$/year]	$ 49.91	$ 50.71	$ 70.51	$ 51.52	$ 50.88	$ 71.32	$ 60.09	$ 52.31	$ 51.67	$ 71.47
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 249.89	$ 253.86	$ 352.99	$ 257.91	$ 254.72	$ 357.04	$ 300.83	$ 261.88	$ 258.69	$ 357.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	1109.2	1126.8	1566.8	1144.8	1130.6	1584.8	1335.3	1162.4	1148.2	1588.2
Net Present Value [$]	$ 23.97	$ 115.47	$ 3,831.5	$ 120.44	$ 191.82	$ 3,969.54	$ 568.69	$ 259.69	$ 331.02	$ 4,045.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	USI1 40 SHGC0 35	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,566.12	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.	$.

MEDIUM 018WWR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 9,458.47	$ 9,679.21	$ 9,773.4	$ 9,994.14	$ 10,008.47	$ 10,229.21	$ 10,308.47	$ 10,323.4	$ 8,184.47	$ 10,421.51
ICC with multiplier (Van=1.0,this Cz =1)	$ 9,458.47	$ 9,679.21	$ 9,773.4	$ 9,994.14	$ 10,008.47	$ 10,229.21	$ 10,308.47	$ 10,323.4	$ 8,184.47	$ 10,421.51
Net Present Value [$]	$ 7,613.66	$ 7,762.28	$ 7,836.39	$ 7,985.	$ 7,691.5	$ 7,912.24	$ 7,773.12	$ 7,961.88	$ 3,596.66	$ 8,588.2
Incremental dollars per GHG saving	$ 3.	$ 3.07	$ 3.1	$ 3.17	$ 3.17	$ 3.24	$ 3.27	$ 3.27	$ 3.29	$ 3.3
Auxiliary Energy Required Heating [GJ/yr]	30.6	30.2	30.2	29.8	30.3	30	30.2	29.9	29.4	30.2
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.8	7.3	7.3	6.9	7.3	13.5	7.8
Annual Energy Space Heating [GJ/yr]	10.7	10.6	10.6	10.5	10.6	10.5	10.5	10.4	10.3	10.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	45.7	45.6	45.6	45.5	45	45	44.7	45	51.1	45.7
Design Heating Load [W]	6167.2	6112.9	6121.1	6066.7	6167.2	6112.9	6167.2	6121.1	6423.3	6252
Annual Energy Electricity [kWh/yr]	12689.2	12661.2	12653.4	12625.4	12505.8	12505.8	12421	12488.5	10445.6	12693.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,732.21	$ 1,728.24	$ 1,727.14	$ 1,723.18	$ 1,706.26	$ 1,706.26	$ 1,694.26	$ 1,703.81	$ 1,414.74	$ 1,732.84
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	362.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$ 156.2	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11356	11626	12976	13246	11357	11627	11358	12977	1633	6496
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2131101011	Pkg2131102011	Pkg2121101011	Pkg2121102011	Pkg2121101011	Pkg2131101011	Pkg1221101011	Pkg1221101011
GHGI [kg/m2]	0.6	0.59	0.59	0.59	0.59	0.59	0.58	0.59	3.45	0.6
% ICC	1.8%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	1.6%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	36.2	35.8	35.8	35.4	35.9	35.5	35.7	35.5	34.9	35.8
Output: MEUI [kWh/(m2 * yr)]	23.7	23.6	23.6	23.4	22.9	22.9	22.6	22.8	30.1	23.7
Output: Better than ERS (%)	4010.0%	4020.0%	4020.0%	4040.0%	4100.0%	4100.0%	4140.0%	4100.0%	3320.0%	4010.0%
Output: Better than Envelope (%)	2390.0%	2230.0%	2230.0%	2060.0%	2270.0%	2150.0%	2230.0%	2110.0%	1900.0%	2230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4732	4704	4696	4668	4548	4548	4464	4531	2488	4736
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 667.2	$ 663.25	$ 662.15	$ 658.2	$ 641.34	$ 641.34	$ 629.38	$ 638.9	$ 350.85	$ 667.83
Annual savings in carbon tax for electricity [$/year]	$ 2.37	$ 2.35	$ 2.35	$ 2.33	$ 2.27	$ 2.27	$ 2.23	$ 2.27	$ 1.24	$ 2.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 669.56	$ 665.6	$ 664.5	$ 660.54	$ 643.61	$ 643.61	$ 631.61	$ 641.16	$ 352.09	$ 670.2
Annual savings in GHG from electricity savings [kg CO2e/year]	52.1	51.7	51.7	51.3	50	50	49.1	49.8	27.4	52.1
Annual savings in natural gas [m3/year]	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39	48.9	62.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 453.08	$ 578.08
Annual savings in carbon tax for natural gas [$/year]	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 113.09	$ 144.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 566.17	$ 722.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	2513	3206.3
Net Present Value [$]	$ 7,613.66	$ 7,762.28	$ 7,836.39	$ 7,985.	$ 7,691.5	$ 7,912.24	$ 7,773.12	$ 7,961.88	$ 3,596.66	$ 8,588.2
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$.	$.

MEDIUM 018WWR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,100.59	$ 6,600.59	$ 7,321.33	$ 6,821.33	$ 7,415.52	$ 6,915.52	$ 7,650.59	$ 7,150.59	$ 7,636.26	$ 7,136.26
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,100.59	$ 6,600.59	$ 7,321.33	$ 6,821.33	$ 7,415.52	$ 6,915.52	$ 7,650.59	$ 7,150.59	$ 7,636.26	$ 7,136.26
Net Present Value [$]	$ 577.49	$ 568.69	$ 433.74	$ 425.85	$ 352.9	$ 346.16	$ 269.47	$ 260.61	$ 208.24	$ 202.96
Incremental dollars per GHG saving	$ 4.89	$ 4.92	$ 4.99	$ 5.02	$ 5.04	$ 5.08	$ 5.08	$ 5.12	$ 5.14	$ 5.18
Auxiliary Energy Required Heating [GJ/yr]	20	22	19.7	21.7	19.6	21.6	20	22	19.3	21.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	21.1	23.3	20.8	23	20.8	22.9	21.2	23.3	20.4	22.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	61	63.2	60.7	62.8	60.6	62.8	59.9	62.1	60.3	62.5
Design Heating Load [W]	5548.5	5923.4	5494.2	5869.1	5502.3	5877.2	5548.5	5923.4	5448	5822.9
Annual Energy Electricity [kWh/yr]	7430.7	7441.6	7429.1	7439.9	7428.8	7439.6	7430.8	7441.6	7427.2	7438
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 988.13	$ 989.67	$ 987.9	$ 989.43	$ 987.86	$ 989.39	$ 988.14	$ 989.67	$ 987.63	$ 989.16
Annual Energy Natural Gas [m3/yr]	919.8	977.2	911.1	968.4	909.6	966.8	890.9	948.3	901	958
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 396.77	$ 421.53	$ 393.02	$ 417.73	$ 392.37	$ 417.04	$ 384.3	$ 409.06	$ 388.66	$ 413.25
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	1732	11722	2002	13072	3352	11453	1733	13342	3622
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg1121102031	Pkg2131101031	Pkg1131101031	Pkg2121101031	Pkg1121101031	Pkg2131102031	Pkg1131102031
GHGI [kg/m2]	7.86	8.33	7.79	8.26	7.78	8.25	7.63	8.1	7.71	8.17
% ICC	1.4%	1.3%	1.4%	1.3%	1.4%	1.3%	1.5%	1.4%	1.5%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	23.7	26.1	23.3	25.7	23.2	25.7	23.7	26.1	22.9	25.3
Output: MEUI [kWh/(m2 * yr)]	41.9	44.5	41.5	44.1	41.5	44	40.7	43.2	41.1	43.6
Output: Better than ERS (%)	1970.0%	1680.0%	2010.0%	1740.0%	2030.0%	1740.0%	2120.0%	1830.0%	2070.0%	1780.0%
Output: Better than Envelope (%)	1900.0%	1090.0%	2020.0%	1210.0%	2060.0%	1260.0%	1900.0%	1090.0%	2190.0%	1380.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	527	516	528	517	528	518	526	516	530	519
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 74.25	$ 72.71	$ 74.48	$ 72.95	$ 74.52	$ 73.	$ 74.24	$ 72.71	$ 74.74	$ 73.22
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .27	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 74.51	$ 72.97	$ 74.74	$ 73.21	$ 74.78	$ 73.25	$ 74.5	$ 72.97	$ 75.01	$ 73.48
Annual savings in GHG from electricity savings [kg CO2e/year]	5.8	5.7	5.8	5.7	5.8	5.7	5.8	5.7	5.8	5.7
Annual savings in natural gas [m3/year]	28.12	25.98	28.45	26.31	28.5	26.37	29.2	27.06	28.82	26.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 260.56	$ 240.75	$ 263.56	$ 243.78	$ 264.08	$ 244.34	$ 270.54	$ 250.72	$ 267.05	$ 247.37
Annual savings in carbon tax for natural gas [$/year]	$ 65.03	$ 60.09	$ 65.78	$ 60.85	$ 65.91	$ 60.98	$ 67.52	$ 62.58	$ 66.65	$ 61.74
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 325.59	$ 300.83	$ 329.35	$ 304.63	$ 329.99	$ 305.32	$ 338.06	$ 313.3	$ 333.7	$ 309.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	1445.2	1335.3	1461.9	1352.2	1464.7	1355.2	1500.5	1390.6	1481.2	1372.1
Net Present Value [$]	$ 577.49	$ 568.69	$ 433.74	$ 425.85	$ 352.9	$ 346.16	$ 269.47	$ 260.61	$ 208.24	$ 202.96
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.

MEDIUM 018WWR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 7,950.59	$ 8,171.33	$ 8,186.26	$ 8,265.52	$ 8,410.26	$ 8,486.26	$ 8,563.63	$ 8,784.37	$ 8,878.56	$ 8,945.33
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,950.59	$ 8,171.33	$ 8,186.26	$ 8,265.52	$ 8,410.26	$ 8,486.26	$ 8,563.63	$ 8,784.37	$ 8,878.56	$ 8,945.33
Net Present Value [$]	$ 125.24	$ 19.41	$ 99.6	$ 99.53	$ 3,876.19	$ 243.82	$ 315.66	$ 459.95	$ 542.13	$ 3,757.86
Incremental dollars per GHG saving	$ 5.16	$ 5.24	$ 5.31	$ 5.29	$ 4.22	$ 5.38	$ 5.44	$ 5.52	$ 5.57	$ 4.48
Auxiliary Energy Required Heating [GJ/yr]	20	19.7	19.3	19.6	22.3	19.3	17.7	17.4	17.3	22.3
Annual Energy DHW [GJ/yr]	11.7	11.7	12.4	11.7	7.8	11.7	13.5	13.5	13.5	6.9
Annual Energy Space Heating [GJ/yr]	21.2	20.8	20.4	20.8	23.7	20.4	18.7	18.4	18.3	23.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	59.2	58.9	59.2	58.8	57.9	58.5	58.6	58.2	58.2	56.9
Design Heating Load [W]	5548.5	5494.2	5448	5502.3	5568.4	5448	5253.4	5199.1	5207.2	5614.5
Annual Energy Electricity [kWh/yr]	7430.8	7429.2	7427.2	7428.9	9613.7	7427.2	7418.6	7416.9	7416.7	9360.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 988.14	$ 987.92	$ 987.63	$ 987.87	$ 1,297.02	$ 987.63	$ 986.42	$ 986.18	$ 986.15	$ 1,261.25
Annual Energy Natural Gas [m3/yr]	872.3	863.7	872.1	862.1	624.2	853.5	855.5	846.9	845.5	623.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 376.28	$ 372.57	$ 376.19	$ 371.88	$ 269.26	$ 368.17	$ 369.03	$ 365.32	$ 364.72	$ 269.13
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11454	11724	13343	13074	13345	13344	17824	18094	20956	11727
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2131102031	Pkg2131102031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2121102031
GHGI [kg/m2]	7.47	7.4	7.47	7.39	5.55	7.32	7.34	7.27	7.25	5.54
% ICC	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	23.7	23.3	22.9	23.2	26.5	22.9	20.9	20.6	20.5	26.5
Output: MEUI [kWh/(m2 * yr)]	39.8	39.4	39.8	39.4	38.2	39	39	38.7	38.6	37.1
Output: Better than ERS (%)	2210.0%	2250.0%	2210.0%	2260.0%	2370.0%	2300.0%	2290.0%	2340.0%	2340.0%	2500.0%
Output: Better than Envelope (%)	1900.0%	2020.0%	2190.0%	2060.0%	970.0%	2190.0%	2830.0%	2960.0%	3000.0%	970.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	526	528	530	528	1656	530	539	540	541	1404
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 74.24	$ 74.46	$ 74.74	$ 74.5	$ 233.55	$ 74.74	$ 75.96	$ 76.2	$ 76.22	$ 197.91
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .27	$ .26	$ .83	$ .27	$ .27	$ .27	$ .27	$ .7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 74.5	$ 74.73	$ 75.01	$ 74.77	$ 234.38	$ 75.01	$ 76.23	$ 76.47	$ 76.49	$ 198.61
Annual savings in GHG from electricity savings [kg CO2e/year]	5.8	5.8	5.8	5.8	18.2	5.8	5.9	5.9	5.9	15.4
Annual savings in natural gas [m3/year]	29.89	30.21	29.9	30.27	39.14	30.59	30.52	30.84	30.89	39.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 276.96	$ 279.93	$ 277.03	$ 280.48	$ 362.6	$ 283.45	$ 282.76	$ 285.73	$ 286.21	$ 362.71
Annual savings in carbon tax for natural gas [$/year]	$ 69.13	$ 69.87	$ 69.14	$ 70.01	$ 90.5	$ 70.75	$ 70.57	$ 71.32	$ 71.44	$ 90.53
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 346.08	$ 349.79	$ 346.17	$ 350.48	$ 453.11	$ 354.19	$ 353.33	$ 357.04	$ 357.64	$ 453.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	1536.2	1552.6	1536.5	1555.7	2011.2	1572.2	1568.3	1584.8	1587.5	2011.8
Net Present Value [$]	$ 125.24	$ 19.41	$ 99.6	$ 99.53	$ 3,876.19	$ 243.82	$ 315.66	$ 459.95	$ 542.13	$ 3,757.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	10.51	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$.	$ 850.	$.	$.	$.	$ 850.

MEDIUM 018WWR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 11,560.26	$ 11,889.52	$ 12,095.33	$ 12,110.26	$ 12,189.52	$ 12,384.59	$ 12,410.26	$ 12,487.63	$ 12,605.33	$ 12,708.37
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,560.26	$ 11,889.52	$ 12,095.33	$ 12,110.26	$ 12,189.52	$ 12,384.59	$ 12,410.26	$ 12,487.63	$ 12,605.33	$ 12,708.37
Net Present Value [$]	$ 8,062.87	$ 7,993.55	$ 7,945.02	$ 8,158.79	$ 7,980.78	$ 9,442.99	$ 8,169.39	$ 8,548.21	$ 9,618.63	$ 8,718.19
Incremental dollars per GHG saving	$ 3.66	$ 3.76	$ 3.82	$ 3.83	$ 3.85	$ 3.92	$ 3.92	$ 3.95	$ 3.99	$ 4.02
Auxiliary Energy Required Heating [GJ/yr]	22.3	22.4	22.3	22.1	22.2	21.7	21.9	20.6	21.4	20.3
Annual Energy DHW [GJ/yr]	7.8	7.3	6.9	7.3	6.9	7.8	6.9	7.8	7.8	7.8
Annual Energy Space Heating [GJ/yr]	7.9	7.9	7.9	7.8	7.8	7.7	7.8	7.3	7.6	7.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	1.7	0.7	0.7	1.7	0.7
Total Energy [GJ/yr]	43.4	42.8	42.5	42.7	42.4	44.1	42.3	42.8	44.1	42.7
Design Heating Load [W]	5614.3	5668.6	5660.4	5614.3	5668.6	5295.5	5614.3	5419.7	5241.2	5365.3
Annual Energy Electricity [kWh/yr]	12047.3	11892.5	11793.7	11870.9	11771	12263.2	11758.5	11875.6	12245.7	11855.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,641.38	$ 1,619.47	$ 1,605.49	$ 1,616.42	$ 1,602.28	$ 1,671.93	$ 1,600.51	$ 1,617.08	$ 1,669.45	$ 1,614.29
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	13354	13085	11736	13355	13086	11482	13356	17836	11752	18106
Upgrade Package List	Pkg2131102031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2121101032	Pkg2131102031	Pkg2221101031	Pkg2121102032	Pkg2221102031
GHGI [kg/m2]	0.57	0.56	0.55	0.56	0.55	0.58	0.55	0.56	0.57	0.56
% ICC	2.2%	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.4	26.5	26.4	26.1	26.3	25.8	26	24.4	25.4	24
Output: MEUI [kWh/(m2 * yr)]	20.9	20.2	19.8	20.1	19.7	21.8	19.7	20.2	21.7	20.1
Output: Better than ERS (%)	4310.0%	4390.0%	4430.0%	4400.0%	4440.0%	4220.0%	4460.0%	4390.0%	4220.0%	4400.0%
Output: Better than Envelope (%)	970.0%	930.0%	970.0%	1050.0%	1010.0%	1210.0%	1130.0%	1660.0%	1340.0%	1780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4090	3935	3836	3914	3814	4306	3801	3918	4288	3899
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 576.69	$ 554.86	$ 540.93	$ 551.82	$ 537.73	$ 607.13	$ 535.97	$ 552.48	$ 604.66	$ 549.7
Annual savings in carbon tax for electricity [$/year]	$ 2.04	$ 1.97	$ 1.92	$ 1.96	$ 1.91	$ 2.15	$ 1.9	$ 1.96	$ 2.14	$ 1.95
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 578.73	$ 556.83	$ 542.85	$ 553.77	$ 539.64	$ 609.28	$ 537.87	$ 554.44	$ 606.81	$ 551.65
Annual savings in GHG from electricity savings [kg CO2e/year]	45	43.3	42.2	43	42	47.4	41.8	43.1	47.2	42.9
Annual savings in natural gas [m3/year]	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08
Annual savings in carbon tax for natural gas [$/year]	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3
Net Present Value [$]	$ 8,062.87	$ 7,993.55	$ 7,945.02	$ 8,158.79	$ 7,980.78	$ 9,442.99	$ 8,169.39	$ 8,548.21	$ 9,618.63	$ 8,718.19
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	8.78	10.51	8.78	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 60	NA	NA	HRV sre 60	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,360.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.	$.	$.	$.

MEDIUM 018WWR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,950.59	$ 8,171.33	$ 8,265.52	$ 8,186.26	$ 8,486.26	$ 8,563.63	$ 8,784.37	$ 8,878.56	$ 9,113.63	$ 9,099.3
ICC with multiplier (Van=1.0,this Cz =1)	$ 7,950.59	$ 8,171.33	$ 8,265.52	$ 8,186.26	$ 8,486.26	$ 8,563.63	$ 8,784.37	$ 8,878.56	$ 9,113.63	$ 9,099.3
Net Present Value [$]	$ 125.24	$ 19.41	$ 99.53	$ 99.6	$ 243.82	$ 315.66	$ 459.95	$ 542.13	$ 623.74	$ 687.57
Incremental dollars per GHG saving	$ 5.16	$ 5.24	$ 5.29	$ 5.31	$ 5.38	$ 5.44	$ 5.52	$ 5.57	$ 5.59	$ 5.65
Auxiliary Energy Required Heating [GJ/yr]	20	19.7	19.6	19.3	19.3	17.7	17.4	17.3	17.7	17
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	12.4	11.7	13.5	13.5	13.5	12.4	13.5
Annual Energy Space Heating [GJ/yr]	21.2	20.8	20.8	20.4	20.4	18.7	18.4	18.3	18.7	18
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	59.2	58.9	58.8	59.2	58.5	58.6	58.2	58.2	57.5	57.9
Design Heating Load [W]	5548.5	5494.2	5502.3	5448	5448	5253.4	5199.1	5207.2	5253.4	5152.9
Annual Energy Electricity [kWh/yr]	7430.8	7429.2	7428.9	7427.2	7427.2	7418.6	7416.9	7416.7	7418.6	7415.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 988.14	$ 987.92	$ 987.87	$ 987.63	$ 987.63	$ 986.42	$ 986.18	$ 986.15	$ 986.42	$ 985.92
Annual Energy Natural Gas [m3/yr]	872.3	863.7	862.1	872.1	853.5	855.5	846.9	845.5	826.6	837
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 376.28	$ 372.57	$ 371.88	$ 376.19	$ 368.17	$ 369.03	$ 365.32	$ 364.72	$ 356.57	$ 361.05
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11454	11724	13074	13343	13344	17824	18094	20956	17825	21226
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2131102031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2231102031
GHGI [kg/m2]	7.47	7.4	7.39	7.47	7.32	7.34	7.27	7.25	7.1	7.19
% ICC	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	23.7	23.3	23.2	22.9	22.9	20.9	20.6	20.5	20.9	20.1
Output: MEUI [kWh/(m2 * yr)]	39.8	39.4	39.4	39.8	39	39	38.7	38.6	37.8	38.2
Output: Better than ERS (%)	2210.0%	2250.0%	2260.0%	2210.0%	2300.0%	2290.0%	2340.0%	2340.0%	2430.0%	2380.0%
Output: Better than Envelope (%)	1900.0%	2020.0%	2060.0%	2190.0%	2190.0%	2830.0%	2960.0%	3000.0%	2830.0%	3120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	526	528	528	530	530	539	540	541	539	542
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 74.24	$ 74.46	$ 74.5	$ 74.74	$ 74.74	$ 75.96	$ 76.2	$ 76.22	$ 75.96	$ 76.45
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 74.5	$ 74.73	$ 74.77	$ 75.01	$ 75.01	$ 76.23	$ 76.47	$ 76.49	$ 76.23	$ 76.72
Annual savings in GHG from electricity savings [kg CO2e/year]	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	6
Annual savings in natural gas [m3/year]	29.89	30.21	30.27	29.9	30.59	30.52	30.84	30.89	31.6	31.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 276.96	$ 279.93	$ 280.48	$ 277.03	$ 283.45	$ 282.76	$ 285.73	$ 286.21	$ 292.73	$ 289.14
Annual savings in carbon tax for natural gas [$/year]	$ 69.13	$ 69.87	$ 70.01	$ 69.14	$ 70.75	$ 70.57	$ 71.32	$ 71.44	$ 73.06	$ 72.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 346.08	$ 349.79	$ 350.48	$ 346.17	$ 354.19	$ 353.33	$ 357.04	$ 357.64	$ 365.8	$ 361.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	1536.2	1552.6	1555.7	1536.5	1572.2	1568.3	1584.8	1587.5	1623.7	1603.7
Net Present Value [$]	$ 125.24	$ 19.41	$ 99.53	$ 99.6	$ 243.82	$ 315.66	$ 459.95	$ 542.13	$ 623.74	$ 687.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	10.51	8.78	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,251.08	$ 15,345.27	$ 15,470.34	$ 15,566.01	$ 15,691.08	$ 15,711.96	$ 15,785.27	$ 15,801.08	$ 15,806.15	$ 15,887.83
ICC with multiplier (Van=1.0,this Cz =1)	$ 15,251.08	$ 15,345.27	$ 15,470.34	$ 15,566.01	$ 15,691.08	$ 15,711.96	$ 15,785.27	$ 15,801.08	$ 15,806.15	$ 15,887.83
Net Present Value [$]	$ 8,237.45	$ 8,290.55	$ 8,247.83	$ 8,458.89	$ 8,442.09	$ 8,698.33	$ 8,507.62	$ 8,545.23	$ 8,751.43	$ 8,784.73
Incremental dollars per GHG saving	$ 6.11	$ 6.15	$ 6.2	$ 6.24	$ 6.28	$ 6.3	$ 6.32	$ 6.19	$ 6.33	$ 6.36
Auxiliary Energy Required Heating [GJ/yr]	15.2	15.2	14.5	14.9	14.2	15.2	14.2	15.2	15.2	14.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	5.4	5.4	5.1	5.3	5.1	5.4	5.1	5.4	5.4	5.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.7	47.6	47.4	47.6	47.4	47.7	47.3	46.6	47.6	47.6
Design Heating Load [W]	4636.4	4644.5	4584	4590.2	4529.6	4636.4	4537.8	4636.4	4644.5	4604.4
Annual Energy Electricity [kWh/yr]	9503.3	9487.4	9422.2	9467	9411.9	9503.3	9400.8	9504	9487.4	9468.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,281.4	$ 1,279.15	$ 1,269.93	$ 1,276.27	$ 1,268.47	$ 1,281.4	$ 1,266.9	$ 1,281.5	$ 1,279.15	$ 1,276.49
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	333	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	35869	37597	35671	37813	35887	36517	37615	35870	38245	36085
Upgrade Package List	Pkg3221202032	Pkg3231201032	Pkg3221201033	Pkg3231202032	Pkg3221202033	Pkg3221302032	Pkg3231201033	Pkg3221202032	Pkg3231301032	Pkg3221203032
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.17	3.4	3.4
% ICC	2.9%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18	18	17.2	17.6	16.9	18	16.8	18	18	17.6
Output: MEUI [kWh/(m2 * yr)]	26	25.9	25.7	25.9	25.6	26	25.6	24.7	25.9	25.9
Output: Better than ERS (%)	3760.0%	3780.0%	3800.0%	3780.0%	3800.0%	3760.0%	3820.0%	3910.0%	3780.0%	3780.0%
Output: Better than Envelope (%)	3850.0%	3850.0%	4130.0%	3970.0%	4250.0%	3850.0%	4250.0%	3850.0%	3850.0%	4010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1546	1530	1465	1510	1455	1546	1444	1547	1530	1511
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 217.99	$ 215.74	$ 206.55	$ 212.87	$ 205.1	$ 217.99	$ 203.53	$ 218.08	$ 215.74	$ 213.09
Annual savings in carbon tax for electricity [$/year]	$ .77	$ .77	$ .73	$ .75	$ .73	$ .77	$ .72	$ .77	$ .77	$ .76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 218.76	$ 216.51	$ 207.28	$ 213.62	$ 205.83	$ 218.76	$ 204.26	$ 218.86	$ 216.51	$ 213.85
Annual savings in GHG from electricity savings [kg CO2e/year]	17	16.8	16.1	16.6	16	17	15.9	17	16.8	16.6
Annual savings in natural gas [m3/year]	48.9	48.9	48.9	48.9	48.9	48.9	48.9	49.99	48.9	48.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 463.13	$ 453.08	$ 453.08
Annual savings in carbon tax for natural gas [$/year]	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 115.59	$ 113.09	$ 113.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 578.72	$ 566.17	$ 566.17
Annual savings in GHG from natural gas savings [kg CO2e/year]	2513	2513	2513	2513	2513	2513	2513	2568.8	2513	2513
Net Present Value [$]	$ 8,237.45	$ 8,290.55	$ 8,247.83	$ 8,458.89	$ 8,442.09	$ 8,698.33	$ 8,507.62	$ 8,545.23	$ 8,751.43	$ 8,784.73
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	8.78	10.51	8.78	14.09
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 018WWR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 17,719.7	$ 17,755.37	$ 17,940.44	$ 17,990.44	$ 18,034.63	$ 18,084.63	$ 18,077.19	$ 18,180.58	$ 18,216.25	$ 18,255.37
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,719.7	$ 17,755.37	$ 17,940.44	$ 17,990.44	$ 18,034.63	$ 18,084.63	$ 18,077.19	$ 18,180.58	$ 18,216.25	$ 18,255.37
Net Present Value [$]	$ 13,201.3	$ 13,269.65	$ 13,359.78	$ 13,139.92	$ 13,436.99	$ 13,198.32	$ 13,600.05	$ 13,662.18	$ 13,730.53	$ 13,594.37
Incremental dollars per GHG saving	$ 5.6	$ 5.61	$ 5.67	$ 5.68	$ 5.7	$ 5.71	$ 5.71	$ 5.74	$ 5.76	$ 5.77
Auxiliary Energy Required Heating [GJ/yr]	15.1	15.1	14.8	15.2	14.7	15.2	15	15.1	15.1	14.4
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.8	7.3	7.8	7.8	7.8	7.8
Annual Energy Space Heating [GJ/yr]	5.4	5.4	5.3	5.4	5.2	5.4	5.4	5.4	5.4	5.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	41.9	42	41.9	41.5	41.8	41.4	42	41.9	42	41.7
Design Heating Load [W]	4474.8	4397.2	4420.5	4443.4	4428.7	4451.5	4411.4	4474.8	4397.2	4374.3
Annual Energy Electricity [kWh/yr]	11650.7	11663.4	11626.5	11521.7	11619.9	11507.8	11666.7	11650.7	11663.4	11595.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,585.26	$ 1,587.06	$ 1,581.83	$ 1,567.01	$ 1,580.9	$ 1,565.04	$ 1,587.52	$ 1,585.26	$ 1,587.06	$ 1,577.42
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43468	45610	43684	43667	45412	45395	43882	44116	46258	45628
Upgrade Package List	Pkg3321201034	Pkg3321202033	Pkg3321202034	Pkg3321202033	Pkg3321201034	Pkg3321201033	Pkg3321203033	Pkg3321301034	Pkg3331302033	Pkg3331202034
GHGI [kg/m2]	0.55	0.55	0.55	0.54	0.55	0.54	0.55	0.55	0.55	0.54
% ICC	3.4%	3.4%	3.4%	3.4%	3.4%	3.5%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.9	17.9	17.5	18.1	17.5	18	17.8	17.9	17.9	17.1
Output: MEUI [kWh/(m2 * yr)]	19.2	19.2	19.1	18.6	19.1	18.6	19.3	19.2	19.2	19
Output: Better than ERS (%)	4510.0%	4500.0%	4510.0%	4560.0%	4520.0%	4570.0%	4500.0%	4510.0%	4500.0%	4530.0%
Output: Better than Envelope (%)	3890.0%	3890.0%	4010.0%	3850.0%	4050.0%	3850.0%	3930.0%	3890.0%	3890.0%	4170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3693	3706	3669	3564	3663	3550	3709	3693	3706	3638
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 520.77	$ 522.56	$ 517.36	$ 502.58	$ 516.43	$ 500.62	$ 523.03	$ 520.77	$ 522.56	$ 512.96
Annual savings in carbon tax for electricity [$/year]	$ 1.85	$ 1.85	$ 1.83	$ 1.78	$ 1.83	$ 1.78	$ 1.85	$ 1.85	$ 1.85	$ 1.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 522.62	$ 524.41	$ 519.19	$ 504.36	$ 518.26	$ 502.4	$ 524.88	$ 522.62	$ 524.41	$ 514.78
Annual savings in GHG from electricity savings [kg CO2e/year]	40.6	40.8	40.4	39.2	40.3	39.1	40.8	40.6	40.8	40
Annual savings in natural gas [m3/year]	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39	62.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08	$ 578.08
Annual savings in carbon tax for natural gas [$/year]	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29	$ 144.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36	$ 722.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3	3206.3
Net Present Value [$]	$ 13,201.3	$ 13,269.65	$ 13,359.78	$ 13,139.92	$ 13,436.99	$ 13,198.32	$ 13,600.05	$ 13,662.18	$ 13,730.53	$ 13,594.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	8.78	8.78	14.09	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR80	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 1,163.13	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$.	$.

MEDIUM 018WWR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 15,251.08	$ 15,470.34	$ 15,345.27	$ 15,691.08	$ 15,566.01	$ 15,785.27	$ 15,801.08	$ 16,020.34	$ 15,970.34	$ 15,895.27
ICC with multiplier (Van=1.0,this Cz =1)	$ 15,251.08	$ 15,470.34	$ 15,345.27	$ 15,691.08	$ 15,566.01	$ 15,785.27	$ 15,801.08	$ 16,020.34	$ 15,970.34	$ 15,895.27
Net Present Value [$]	$ 8,237.45	$ 8,247.83	$ 8,290.55	$ 8,442.09	$ 8,458.89	$ 8,507.62	$ 8,545.23	$ 8,555.79	$ 8,578.21	$ 8,598.52
Incremental dollars per GHG saving	$ 6.11	$ 6.2	$ 6.15	$ 6.28	$ 6.24	$ 6.32	$ 6.19	$ 6.28	$ 6.39	$ 6.23
Auxiliary Energy Required Heating [GJ/yr]	15.2	14.5	15.2	14.2	14.9	14.2	15.2	14.5	13.9	15.2
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4	13.5	12.4
Annual Energy Space Heating [GJ/yr]	5.4	5.1	5.4	5.1	5.3	5.1	5.4	5.2	4.9	5.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.7	47.4	47.6	47.4	47.6	47.3	46.6	46.3	47.2	46.6
Design Heating Load [W]	4636.4	4584	4644.5	4529.6	4590.2	4537.8	4636.4	4584	4561.1	4644.5
Annual Energy Electricity [kWh/yr]	9503.3	9422.2	9487.4	9411.9	9467	9400.8	9504	9422.9	9356.3	9488.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,281.4	$ 1,269.93	$ 1,279.15	$ 1,268.47	$ 1,276.27	$ 1,266.9	$ 1,281.5	$ 1,270.03	$ 1,260.6	$ 1,279.25
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	333	333	362.1	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64	$ 156.2	$ 143.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	35869	35671	37597	35887	37813	37615	35870	35672	35689	37598
Upgrade Package List	Pkg3221202032	Pkg3221201033	Pkg3231201032	Pkg3221202033	Pkg3231202032	Pkg3231201033	Pkg3221202032	Pkg3221201033	Pkg3221201034	Pkg3231201032
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.4	3.4	3.17	3.16	3.4	3.17
% ICC	2.9%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18	17.2	18	16.9	17.6	16.8	18	17.2	16.4	18
Output: MEUI [kWh/(m2 * yr)]	26	25.7	25.9	25.6	25.9	25.6	24.7	24.4	25.4	24.7
Output: Better than ERS (%)	3760.0%	3800.0%	3780.0%	3800.0%	3780.0%	3820.0%	3910.0%	3950.0%	3830.0%	3910.0%
Output: Better than Envelope (%)	3850.0%	4130.0%	3850.0%	4250.0%	3970.0%	4250.0%	3850.0%	4130.0%	4370.0%	3850.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1546	1465	1530	1455	1510	1444	1547	1466	1399	1531
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 217.99	$ 206.55	$ 215.74	$ 205.1	$ 212.87	$ 203.53	$ 218.08	$ 206.65	$ 197.26	$ 215.84
Annual savings in carbon tax for electricity [$/year]	$ .77	$ .73	$ .77	$ .73	$ .75	$ .72	$ .77	$ .73	$ .7	$ .77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 218.76	$ 207.28	$ 216.51	$ 205.83	$ 213.62	$ 204.26	$ 218.86	$ 207.38	$ 197.96	$ 216.61
Annual savings in GHG from electricity savings [kg CO2e/year]	17	16.1	16.8	16	16.6	15.9	17	16.1	15.4	16.8
Annual savings in natural gas [m3/year]	48.9	48.9	48.9	48.9	48.9	48.9	49.99	49.99	48.9	49.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 453.08	$ 463.13	$ 463.13	$ 453.08	$ 463.13
Annual savings in carbon tax for natural gas [$/year]	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 113.09	$ 115.59	$ 115.59	$ 113.09	$ 115.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 566.17	$ 578.72	$ 578.72	$ 566.17	$ 578.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	2513	2513	2513	2513	2513	2513	2568.8	2568.8	2513	2568.8
Net Present Value [$]	$ 8,237.45	$ 8,247.83	$ 8,290.55	$ 8,442.09	$ 8,458.89	$ 8,507.62	$ 8,545.23	$ 8,555.79	$ 8,578.21	$ 8,598.52
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 550.

MEDIUM 018WWR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 5,534.47	$ 5,755.21	$ 5,849.4	$ 6,070.14	$ 6,084.47	$ 6,221.33	$ 6,305.21	$ 6,315.52	$ 6,384.47	$ 6,399.4
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 5,938.49	$ 6,175.34	$ 6,276.41	$ 6,513.26	$ 6,528.64	$ 6,675.49	$ 6,765.49	$ 6,776.55	$ 6,850.54	$ 6,866.56
Net Present Value [$]	$ 1,371.61	$ 1,247.22	$ 1,169.96	$ 1,044.96	$ 1,063.17	$ 224.85	$ 939.38	$ 147.4	$ 919.19	$ 861.88
Incremental dollars per GHG saving	$ 4.31	$ 4.41	$ 4.47	$ 4.57	$ 4.54	$ 5.38	$ 4.64	$ 5.45	$ 4.64	$ 4.69
Auxiliary Energy Required Heating [GJ/yr]	36.1	35.7	35.6	35.2	36.1	28.7	35.7	28.6	36.1	35.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	23.7	12.4	23.7	11.7	12.4
Annual Energy Space Heating [GJ/yr]	38.2	37.8	37.7	37.3	38.2	30.4	37.8	30.3	38.2	37.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	78.1	77.7	77.6	77.2	77	80.4	76.6	80.4	76.3	76.5
Design Heating Load [W]	7684.5	7615.2	7629.7	7560.4	7684.5	7817.1	7615.2	7831.6	7684.5	7629.7
Annual Energy Electricity [kWh/yr]	7516.1	7514.1	7513.7	7511.6	7516.2	7477	7514.1	7476.7	7516.2	7513.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,000.21	$ 999.93	$ 999.87	$ 999.58	$ 1,000.23	$ 994.68	$ 999.93	$ 994.64	$ 1,000.23	$ 999.87
Annual Energy Natural Gas [m3/yr]	1370.2	1359.3	1357.4	1346.6	1341.3	1437.1	1330.4	1435.2	1322.7	1328.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 591.06	$ 586.35	$ 585.54	$ 580.88	$ 578.59	$ 619.91	$ 573.89	$ 619.1	$ 570.57	$ 573.07
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11344	11614	12964	13234	11345	1999	11615	3349	11346	12965
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2131101011	Pkg2131102011	Pkg2121101011	Pkg1121102031	Pkg2121102011	Pkg1131101031	Pkg2121101011	Pkg2131101011
GHGI [kg/m2]	11.55	11.46	11.44	11.35	11.31	12.09	11.22	12.07	11.16	11.2
% ICC	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.8	42.3	42.2	41.8	42.8	34	42.3	33.9	42.8	42.2
Output: MEUI [kWh/(m2 * yr)]	62.2	61.7	61.6	61.1	60.9	65	60.4	64.9	60.1	60.3
Output: Better than ERS (%)	1030.0%	1080.0%	1090.0%	1140.0%	1160.0%	1350.0%	1210.0%	1350.0%	1240.0%	1220.0%
Output: Better than Envelope (%)	1140.0%	1020.0%	990.0%	860.0%	1140.0%	1140.0%	1020.0%	1170.0%	1140.0%	990.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	510	512	513	515	510	550	512	550	510	513
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 71.97	$ 72.25	$ 72.3	$ 72.6	$ 71.95	$ 77.48	$ 72.25	$ 77.52	$ 71.95	$ 72.3
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .27	$ .26	$ .27	$ .26	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 72.22	$ 72.5	$ 72.56	$ 72.86	$ 72.21	$ 77.75	$ 72.5	$ 77.8	$ 72.21	$ 72.56
Annual savings in GHG from electricity savings [kg CO2e/year]	5.6	5.6	5.6	5.7	5.6	6	5.6	6	5.6	5.6
Annual savings in natural gas [m3/year]	24.87	25.28	25.35	25.75	25.95	22.38	26.36	22.45	26.64	26.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 230.46	$ 234.22	$ 234.88	$ 238.6	$ 240.43	$ 207.36	$ 244.2	$ 208.02	$ 246.86	$ 244.85
Annual savings in carbon tax for natural gas [$/year]	$ 57.52	$ 58.46	$ 58.62	$ 59.55	$ 60.01	$ 51.76	$ 60.95	$ 51.92	$ 61.61	$ 61.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 287.98	$ 292.68	$ 293.5	$ 298.16	$ 300.45	$ 259.12	$ 305.15	$ 259.94	$ 308.47	$ 305.97
Annual savings in GHG from natural gas savings [kg CO2e/year]	1278.3	1299.1	1302.8	1323.4	1333.6	1150.2	1354.5	1153.8	1369.2	1358.1
Net Present Value [$]	$ 1,371.61	$ 1,247.22	$ 1,169.96	$ 1,044.96	$ 1,063.17	$ 224.85	$ 939.38	$ 147.4	$ 919.19	$ 861.88
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,566.12	$.	$ 1,566.12	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 018WWR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 8,684.47	$ 10,524.59	$ 10,745.33	$ 8,905.21	$ 10,839.52	$ 8,999.4	$ 10,896.89	$ 10,921.51	$ 9,234.47	$ 10,991.08
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,318.44	$ 11,292.89	$ 11,529.74	$ 9,555.29	$ 11,630.8	$ 9,656.36	$ 11,692.36	$ 11,718.78	$ 9,908.59	$ 11,793.43
Net Present Value [$]	$ 5,117.79	$ 9,787.64	$ 9,922.75	$ 5,442.42	$ 9,991.2	$ 5,507.95	$ 10,514.71	$ 10,310.18	$ 5,425.58	$ 10,479.81
Incremental dollars per GHG saving	$ 2.75	$ 2.75	$ 2.8	$ 2.82	$ 2.83	$ 2.85	$ 2.85	$ 2.85	$ 2.87	$ 2.87
Auxiliary Energy Required Heating [GJ/yr]	36	33.9	33.5	35.6	33.5	35.6	36.4	36.5	36	36.3
Annual Energy DHW [GJ/yr]	13.5	7.8	7.8	13.5	7.8	13.5	7.8	7.8	12.4	7.8
Annual Energy Space Heating [GJ/yr]	14.5	13.9	13.8	14.7	13.7	14.6	15.1	15.1	14.5	14.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	57	51.7	51.6	57.2	51.6	57.1	52.2	51.9	55.9	52
Design Heating Load [W]	7743.2	7948.5	7879.2	7673.9	7893.6	7688.3	7879.2	7557.1	7743.2	7893.6
Annual Energy Electricity [kWh/yr]	12093.2	14370.5	14337.2	12133.5	14327.2	12122.4	14508.3	14419.3	12094.1	14458.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,647.87	$ 1,970.11	$ 1,965.4	$ 1,653.58	$ 1,963.98	$ 1,652.	$ 1,989.61	$ 1,977.02	$ 1,648.	$ 1,982.51
Annual Energy Natural Gas [m3/yr]	362.1	0	0	362.1	0	362.1	0	0	332.9	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$.	$.	$ 156.2	$.	$ 156.2	$.	$.	$ 143.6	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11353	1744	2014	11623	3364	12973	1960	17728	11354	3310
Upgrade Package List	Pkg2121101011	Pkg1121101031	Pkg1121102031	Pkg2121102011	Pkg1131101031	Pkg2131101011	Pkg1121102021	Pkg2221101011	Pkg2121101011	Pkg1131101021
GHGI [kg/m2]	3.53	0.67	0.67	3.53	0.67	3.53	0.68	0.68	3.29	0.68
% ICC	1.7%	2.0%	2.1%	1.7%	2.1%	1.7%	2.1%	2.1%	1.8%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	42.7	40.2	39.7	42.2	39.7	42.1	43.1	43.3	42.7	43.1
Output: MEUI [kWh/(m2 * yr)]	36.8	30.3	30.2	36.9	30.1	36.9	31	30.7	35.5	30.8
Output: Better than ERS (%)	3600.0%	4210.0%	4220.0%	3580.0%	4220.0%	3590.0%	4150.0%	4190.0%	3730.0%	4180.0%
Output: Better than Envelope (%)	1110.0%	460.0%	340.0%	990.0%	340.0%	990.0%	1230.0%	1270.0%	1110.0%	1200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4067	6344	6311	4107	6301	4096	6482	6393	4068	6432
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 573.4	$ 894.5	$ 889.81	$ 579.09	$ 888.4	$ 577.52	$ 913.93	$ 901.38	$ 573.53	$ 906.86
Annual savings in carbon tax for electricity [$/year]	$ 2.03	$ 3.17	$ 3.16	$ 2.05	$ 3.15	$ 2.05	$ 3.24	$ 3.2	$ 2.03	$ 3.22
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 575.44	$ 897.68	$ 892.96	$ 581.14	$ 891.55	$ 579.57	$ 917.17	$ 904.58	$ 575.57	$ 910.07
Annual savings in GHG from electricity savings [kg CO2e/year]	44.7	69.8	69.4	45.2	69.3	45.1	71.3	70.3	44.7	70.7
Annual savings in natural gas [m3/year]	62.43	75.93	75.93	62.43	75.93	62.43	75.93	75.93	63.52	75.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.46	$ 703.46	$ 703.46	$ 578.46	$ 703.46	$ 578.46	$ 703.46	$ 703.46	$ 588.54	$ 703.46
Annual savings in carbon tax for natural gas [$/year]	$ 144.38	$ 175.58	$ 175.58	$ 144.38	$ 175.58	$ 144.38	$ 175.58	$ 175.58	$ 146.9	$ 175.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.84	$ 879.04	$ 879.04	$ 722.84	$ 879.04	$ 722.84	$ 879.04	$ 879.04	$ 735.43	$ 879.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.5	3901.8	3901.8	3208.5	3901.8	3208.5	3901.8	3901.8	3264.4	3901.8
Net Present Value [$]	$ 5,117.79	$ 9,787.64	$ 9,922.75	$ 5,442.42	$ 9,991.2	$ 5,507.95	$ 10,514.71	$ 10,310.18	$ 5,425.58	$ 10,479.81
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 25	NA	NA	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$ 1,566.12	$ 1,566.12	$.	$ 1,566.12	$.	$ 1,717.68	$.	$.	$ 1,717.68
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,100.59	$ 7,321.33	$ 7,415.52	$ 6,600.59	$ 7,650.59	$ 7,636.26	$ 6,821.33	$ 6,915.52	$ 5,534.47	$ 7,150.59
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,618.93	$ 7,855.79	$ 7,956.85	$ 7,082.43	$ 8,209.08	$ 8,193.71	$ 7,319.29	$ 7,420.35	$ 5,938.49	$ 7,672.58
Net Present Value [$]	$ 1,865.2	$ 1,736.5	$ 1,655.66	$ 1,642.65	$ 1,557.18	$ 1,527.14	$ 1,515.05	$ 1,434.2	$ 1,371.61	$ 1,334.81
Incremental dollars per GHG saving	$ 4.11	$ 4.19	$ 4.23	$ 4.2	$ 4.29	$ 4.31	$ 4.28	$ 4.33	$ 4.31	$ 4.39
Auxiliary Energy Required Heating [GJ/yr]	27.8	27.4	27.3	30.7	27.8	27	30.3	30.3	36.1	30.7
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	29.4	29	29	32.5	29.4	28.6	32.1	32.1	38.2	32.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	69.3	68.9	68.8	72.4	68.2	68.4	72	71.9	78.1	71.3
Design Heating Load [W]	7107.3	7038	7052.4	7693.1	7107.3	6983.1	7623.8	7638.2	7684.5	7693.1
Annual Energy Electricity [kWh/yr]	7472.1	7470.2	7469.9	7487.6	7472.2	7467.9	7485.6	7485.3	7516.1	7487.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.99	$ 993.72	$ 993.68	$ 996.18	$ 994.	$ 993.39	$ 995.9	$ 995.85	$ 1,000.21	$ 996.18
Annual Energy Natural Gas [m3/yr]	1137.8	1127.4	1125.9	1219.3	1108.9	1115.5	1208.8	1207.3	1370.2	1190.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 490.81	$ 486.32	$ 485.67	$ 525.96	$ 478.34	$ 481.19	$ 521.43	$ 520.79	$ 591.06	$ 513.5
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	1732	11453	13342	2002	3352	11344	1733
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg1121101031	Pkg2121101031	Pkg2131102031	Pkg1121102031	Pkg1131101031	Pkg2121101011	Pkg1121101031
GHGI [kg/m2]	9.64	9.56	9.55	10.31	9.41	9.46	10.23	10.21	11.55	10.08
% ICC	1.4%	1.4%	1.4%	1.3%	1.5%	1.5%	1.3%	1.3%	1.1%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	32.9	32.5	32.4	36.4	32.9	32	35.9	35.9	42.8	36.4
Output: MEUI [kWh/(m2 * yr)]	51.7	51.3	51.2	55.4	50.5	50.7	54.9	54.9	62.2	54.1
Output: Better than ERS (%)	2040.0%	2090.0%	2100.0%	1690.0%	2170.0%	2150.0%	1730.0%	1750.0%	1030.0%	1810.0%
Output: Better than Envelope (%)	1420.0%	1540.0%	1570.0%	520.0%	1420.0%	1670.0%	650.0%	650.0%	1140.0%	520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	554	556	557	539	554	559	541	541	510	539
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 78.17	$ 78.44	$ 78.48	$ 75.98	$ 78.16	$ 78.76	$ 76.27	$ 76.31	$ 71.97	$ 75.98
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .28	$ .28	$ .27	$ .28	$ .28	$ .27	$ .27	$ .26	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 78.45	$ 78.72	$ 78.76	$ 76.25	$ 78.43	$ 79.04	$ 76.54	$ 76.58	$ 72.22	$ 76.25
Annual savings in GHG from electricity savings [kg CO2e/year]	6.1	6.1	6.1	5.9	6.1	6.1	5.9	6	5.6	5.9
Annual savings in natural gas [m3/year]	33.53	33.92	33.98	30.5	34.61	34.36	30.89	30.94	24.87	31.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 310.68	$ 314.27	$ 314.79	$ 282.55	$ 320.66	$ 318.38	$ 286.17	$ 286.69	$ 230.46	$ 292.53
Annual savings in carbon tax for natural gas [$/year]	$ 77.55	$ 78.44	$ 78.57	$ 70.52	$ 80.04	$ 79.47	$ 71.43	$ 71.56	$ 57.52	$ 73.01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 388.23	$ 392.71	$ 393.36	$ 353.07	$ 400.7	$ 397.85	$ 357.6	$ 358.25	$ 287.98	$ 365.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	1723.2	1743.1	1746	1567.2	1778.6	1765.9	1587.3	1590.2	1278.3	1622.5
Net Present Value [$]	$ 1,865.2	$ 1,736.5	$ 1,655.66	$ 1,642.65	$ 1,557.18	$ 1,527.14	$ 1,515.05	$ 1,434.2	$ 1,371.61	$ 1,334.81
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$.	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$ 550.

MEDIUM 018WWR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,871.33	$ 7,950.59	$ 7,965.52	$ 8,171.33	$ 8,186.26	$ 8,265.52	$ 8,486.26	$ 8,563.63	$ 8,784.37	$ 8,878.56
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 8,445.94	$ 8,530.98	$ 8,547.	$ 8,767.84	$ 8,783.86	$ 8,868.9	$ 9,105.76	$ 9,188.77	$ 9,425.63	$ 9,526.69
Net Present Value [$]	$ 1,429.39	$ 1,412.96	$ 1,347.82	$ 1,284.44	$ 1,219.12	$ 1,203.42	$ 1,074.9	$ 1,099.77	$ 972.05	$ 889.26
Incremental dollars per GHG saving	$ 4.36	$ 4.37	$ 4.41	$ 4.44	$ 4.48	$ 4.49	$ 4.56	$ 4.56	$ 4.62	$ 4.67
Auxiliary Energy Required Heating [GJ/yr]	27.4	27.8	27.4	27.4	27	27.4	27	25	24.6	24.5
Annual Energy DHW [GJ/yr]	12.4	11.7	12.4	11.7	12.4	11.7	11.7	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	29	29.4	29	29	28.6	29	28.6	26.4	26	26
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.8	67.5	67.7	67.1	67.3	67.1	66.7	66.3	65.9	65.8
Design Heating Load [W]	7038	7107.3	7052.4	7038	6983.1	7052.4	6983.1	6730.8	6661.4	6675.9
Annual Energy Electricity [kWh/yr]	7470.2	7472.2	7469.9	7470.2	7468	7470	7468	7457.2	7455.3	7455
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.72	$ 994.	$ 993.68	$ 993.72	$ 993.41	$ 993.69	$ 993.41	$ 991.88	$ 991.61	$ 991.57
Annual Energy Natural Gas [m3/yr]	1098.4	1090.3	1097	1079.9	1086.6	1078.4	1068	1059.1	1048.6	1047.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 473.81	$ 470.32	$ 473.21	$ 465.83	$ 468.72	$ 465.18	$ 460.7	$ 456.86	$ 452.33	$ 451.77
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11723	11454	13073	11724	13343	13074	13344	17824	18094	20956
Upgrade Package List	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2131102031	Pkg2221101031	Pkg2221102031	Pkg2231101031
GHGI [kg/m2]	9.32	9.26	9.31	9.17	9.23	9.16	9.07	9	8.92	8.9
% ICC	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.5	32.9	32.4	32.5	32	32.4	32	29.6	29.1	29.1
Output: MEUI [kWh/(m2 * yr)]	50	49.6	49.9	49.2	49.4	49.1	48.6	48.2	47.7	47.7
Output: Better than ERS (%)	2220.0%	2250.0%	2230.0%	2300.0%	2270.0%	2300.0%	2340.0%	2390.0%	2430.0%	2450.0%
Output: Better than Envelope (%)	1540.0%	1420.0%	1540.0%	1540.0%	1670.0%	1540.0%	1670.0%	2280.0%	2410.0%	2440.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	556	554	557	556	558	556	558	569	571	572
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 78.44	$ 78.16	$ 78.48	$ 78.44	$ 78.75	$ 78.47	$ 78.75	$ 80.27	$ 80.54	$ 80.58
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .29	$ .29
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 78.72	$ 78.43	$ 78.76	$ 78.72	$ 79.03	$ 78.74	$ 79.03	$ 80.56	$ 80.82	$ 80.87
Annual savings in GHG from electricity savings [kg CO2e/year]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.3	6.3	6.3
Annual savings in natural gas [m3/year]	35	35.3	35.05	35.69	35.44	35.75	36.13	36.47	36.86	36.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 324.28	$ 327.08	$ 324.77	$ 330.67	$ 328.36	$ 331.19	$ 334.78	$ 337.85	$ 341.48	$ 341.92
Annual savings in carbon tax for natural gas [$/year]	$ 80.94	$ 81.64	$ 81.06	$ 82.53	$ 81.96	$ 82.66	$ 83.56	$ 84.33	$ 85.23	$ 85.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 405.22	$ 408.72	$ 405.83	$ 413.2	$ 410.31	$ 413.85	$ 418.34	$ 422.18	$ 426.71	$ 427.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	1798.7	1814.2	1801.3	1834.1	1821.3	1837	1856.9	1873.9	1894	1896.5
Net Present Value [$]	$ 1,429.39	$ 1,412.96	$ 1,347.82	$ 1,284.44	$ 1,219.12	$ 1,203.42	$ 1,074.9	$ 1,099.77	$ 972.05	$ 889.26
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$.

MEDIUM 018WWR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,250.59	$ 12,487.63	$ 10,471.33	$ 12,708.37	$ 10,565.52	$ 12,802.56	$ 10,800.59	$ 13,023.3	$ 13,037.63	$ 10,786.26
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 10,998.88	$ 13,399.23	$ 11,235.74	$ 13,636.08	$ 11,336.8	$ 13,737.15	$ 11,589.03	$ 13,974.	$ 13,989.38	$ 11,573.66
Net Present Value [$]	$ 5,263.4	$ 10,124.03	$ 5,385.55	$ 10,254.03	$ 5,467.14	$ 10,328.13	$ 5,570.82	$ 10,458.31	$ 10,227.25	$ 5,592.39
Incremental dollars per GHG saving	$ 3.23	$ 3.25	$ 3.3	$ 3.31	$ 3.33	$ 3.34	$ 3.35	$ 3.39	$ 3.39	$ 3.4
Auxiliary Energy Required Heating [GJ/yr]	27.7	28.1	27.3	27.7	27.3	27.7	27.7	27.3	27.9	26.9
Annual Energy DHW [GJ/yr]	13.5	7.8	13.5	7.8	13.5	7.8	12.4	7.8	7.3	13.5
Annual Energy Space Heating [GJ/yr]	11.4	11.5	11.3	11.4	11.3	11.4	11.4	11.3	11.5	11.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	55	49.5	54.9	49.3	54.9	49.3	54	49.2	48.8	54.7
Design Heating Load [W]	7165.9	6979.9	7096.6	6910.6	7111	6925	7165.9	6855.7	6979.9	7041.7
Annual Energy Electricity [kWh/yr]	11541.4	13738.6	11503.1	13703.4	11498.2	13695.6	11542.2	13660.4	13565.1	11461.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,569.79	$ 1,880.7	$ 1,564.37	$ 1,875.72	$ 1,563.68	$ 1,874.61	$ 1,569.91	$ 1,869.63	$ 1,856.15	$ 1,558.43
Annual Energy Natural Gas [m3/yr]	362.1	0	362.1	0	362.1	0	332.9	0	0	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$.	$ 156.2	$.	$ 156.2	$.	$ 143.6	$.	$.	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11461	17836	11731	18106	13081	20968	11462	21238	17837	13351
Upgrade Package List	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2221102031	Pkg2131101031	Pkg2231101031	Pkg2121101031	Pkg2231102031	Pkg2221101031	Pkg2131102031
GHGI [kg/m2]	3.5	0.64	3.5	0.64	3.5	3.5	3.26	0.64	0.64	3.5
% ICC	2.0%	2.4%	2.0%	2.4%	2.0%	2.4%	2.1%	2.5%	2.5%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.8	33.3	32.4	32.9	32.3	32.8	32.9	32.4	33.1	31.9
Output: MEUI [kWh/(m2 * yr)]	34.2	27.6	34	27.4	34	27.4	32.9	27.3	26.8	33.8
Output: Better than ERS (%)	3830.0%	4460.0%	3840.0%	4480.0%	3840.0%	4480.0%	3940.0%	4490.0%	4540.0%	3860.0%
Output: Better than Envelope (%)	1450.0%	1330.0%	1570.0%	1450.0%	1570.0%	1450.0%	1450.0%	1570.0%	1390.0%	1700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3515	5712	3477	5677	3472	5669	3516	5634	5539	3435
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 495.6	$ 805.41	$ 490.2	$ 800.44	$ 489.51	$ 799.34	$ 495.71	$ 794.38	$ 780.94	$ 484.28
Annual savings in carbon tax for electricity [$/year]	$ 1.76	$ 2.86	$ 1.74	$ 2.84	$ 1.74	$ 2.83	$ 1.76	$ 2.82	$ 2.77	$ 1.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 497.36	$ 808.26	$ 491.94	$ 803.28	$ 491.25	$ 802.18	$ 497.47	$ 797.2	$ 783.71	$ 486.
Annual savings in GHG from electricity savings [kg CO2e/year]	38.7	62.8	38.2	62.4	38.2	62.4	38.7	62	60.9	37.8
Annual savings in natural gas [m3/year]	62.43	75.93	62.43	75.93	62.43	75.93	63.52	75.93	75.93	62.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.46	$ 703.46	$ 578.46	$ 703.46	$ 578.46	$ 703.46	$ 588.54	$ 703.46	$ 703.46	$ 578.46
Annual savings in carbon tax for natural gas [$/year]	$ 144.38	$ 175.58	$ 144.38	$ 175.58	$ 144.38	$ 175.58	$ 146.9	$ 175.58	$ 175.58	$ 144.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.84	$ 879.04	$ 722.84	$ 879.04	$ 722.84	$ 879.04	$ 735.43	$ 879.04	$ 879.04	$ 722.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.5	3901.8	3208.5	3901.8	3208.5	3901.8	3264.4	3901.8	3901.8	3208.5
Net Present Value [$]	$ 5,263.4	$ 10,124.03	$ 5,385.55	$ 10,254.03	$ 5,467.14	$ 10,328.13	$ 5,570.82	$ 10,458.31	$ 10,227.25	$ 5,592.39
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	5.28	3.87	5.28	3.87	5.28	3.87	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.

MEDIUM 018WWR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,871.33	$ 7,950.59	$ 7,965.52	$ 8,171.33	$ 8,186.26	$ 8,265.52	$ 8,563.63	$ 8,486.26	$ 8,784.37	$ 8,878.56
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 8,445.94	$ 8,530.98	$ 8,547.	$ 8,767.84	$ 8,783.86	$ 8,868.9	$ 9,188.77	$ 9,105.76	$ 9,425.63	$ 9,526.69
Net Present Value [$]	$ 1,429.39	$ 1,412.96	$ 1,347.82	$ 1,284.44	$ 1,219.12	$ 1,203.42	$ 1,099.77	$ 1,074.9	$ 972.05	$ 889.26
Incremental dollars per GHG saving	$ 4.36	$ 4.37	$ 4.41	$ 4.44	$ 4.48	$ 4.49	$ 4.56	$ 4.56	$ 4.62	$ 4.67
Auxiliary Energy Required Heating [GJ/yr]	27.4	27.8	27.4	27.4	27	27.4	25	27	24.6	24.5
Annual Energy DHW [GJ/yr]	12.4	11.7	12.4	11.7	12.4	11.7	13.5	11.7	13.5	13.5
Annual Energy Space Heating [GJ/yr]	29	29.4	29	29	28.6	29	26.4	28.6	26	26
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.8	67.5	67.7	67.1	67.3	67.1	66.3	66.7	65.9	65.8
Design Heating Load [W]	7038	7107.3	7052.4	7038	6983.1	7052.4	6730.8	6983.1	6661.4	6675.9
Annual Energy Electricity [kWh/yr]	7470.2	7472.2	7469.9	7470.2	7468	7470	7457.2	7468	7455.3	7455
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.72	$ 994.	$ 993.68	$ 993.72	$ 993.41	$ 993.69	$ 991.88	$ 993.41	$ 991.61	$ 991.57
Annual Energy Natural Gas [m3/yr]	1098.4	1090.3	1097	1079.9	1086.6	1078.4	1059.1	1068	1048.6	1047.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 473.81	$ 470.32	$ 473.21	$ 465.83	$ 468.72	$ 465.18	$ 456.86	$ 460.7	$ 452.33	$ 451.77
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11723	11454	13073	11724	13343	13074	17824	13344	18094	20956
Upgrade Package List	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2221101031	Pkg2131102031	Pkg2221102031	Pkg2231101031
GHGI [kg/m2]	9.32	9.26	9.31	9.17	9.23	9.16	9	9.07	8.92	8.9
% ICC	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.5	32.9	32.4	32.5	32	32.4	29.6	32	29.1	29.1
Output: MEUI [kWh/(m2 * yr)]	50	49.6	49.9	49.2	49.4	49.1	48.2	48.6	47.7	47.7
Output: Better than ERS (%)	2220.0%	2250.0%	2230.0%	2300.0%	2270.0%	2300.0%	2390.0%	2340.0%	2430.0%	2450.0%
Output: Better than Envelope (%)	1540.0%	1420.0%	1540.0%	1540.0%	1670.0%	1540.0%	2280.0%	1670.0%	2410.0%	2440.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	556	554	557	556	558	556	569	558	571	572
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 78.44	$ 78.16	$ 78.48	$ 78.44	$ 78.75	$ 78.47	$ 80.27	$ 78.75	$ 80.54	$ 80.58
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .28	$ .29	$ .29
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 78.72	$ 78.43	$ 78.76	$ 78.72	$ 79.03	$ 78.74	$ 80.56	$ 79.03	$ 80.82	$ 80.87
Annual savings in GHG from electricity savings [kg CO2e/year]	6.1	6.1	6.1	6.1	6.1	6.1	6.3	6.1	6.3	6.3
Annual savings in natural gas [m3/year]	35	35.3	35.05	35.69	35.44	35.75	36.47	36.13	36.86	36.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 324.28	$ 327.08	$ 324.77	$ 330.67	$ 328.36	$ 331.19	$ 337.85	$ 334.78	$ 341.48	$ 341.92
Annual savings in carbon tax for natural gas [$/year]	$ 80.94	$ 81.64	$ 81.06	$ 82.53	$ 81.96	$ 82.66	$ 84.33	$ 83.56	$ 85.23	$ 85.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 405.22	$ 408.72	$ 405.83	$ 413.2	$ 410.31	$ 413.85	$ 422.18	$ 418.34	$ 426.71	$ 427.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	1798.7	1814.2	1801.3	1834.1	1821.3	1837	1873.9	1856.9	1894	1896.5
Net Present Value [$]	$ 1,429.39	$ 1,412.96	$ 1,347.82	$ 1,284.44	$ 1,219.12	$ 1,203.42	$ 1,099.77	$ 1,074.9	$ 972.05	$ 889.26
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.	$.	$.

MEDIUM 018WWR Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,945.7	$ 17,166.44	$ 17,260.63	$ 17,303.19	$ 17,406.58	$ 17,481.37	$ 17,495.7	$ 17,618.12	$ 17,627.32	$ 17,702.86
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,182.74	$ 18,419.59	$ 18,520.66	$ 18,566.32	$ 18,677.26	$ 18,757.51	$ 18,772.89	$ 18,904.24	$ 18,914.11	$ 18,995.17
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,263.	$ 10,395.76	$ 10,512.47	$ 10,389.16	$ 10,358.83	$ 10,746.65	$ 10,636.44	$ 10,808.75
Incremental dollars per GHG saving	$ 5.33	$ 5.4	$ 5.43	$ 5.45	$ 5.48	$ 5.5	$ 5.41	$ 5.54	$ 5.55	$ 5.57
Auxiliary Energy Required Heating [GJ/yr]	18.3	18	17.9	18.3	18.3	17.6	18.3	17.9	18	18.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	7.6	7.5	7.5	7.6	7.6	7.3	7.6	7.7	7.5	7.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.4	52.2	52.2	52.3	52.4	52.1	51.3	52.4	52.2	52.4
Design Heating Load [W]	5536.6	5467.3	5481.7	5455.7	5536.6	5412.4	5536.6	5400.8	5467.3	5536.6
Annual Energy Electricity [kWh/yr]	10800.7	10763.1	10760.5	10795.5	10800.7	10723.7	10801.4	10809.5	10763.1	10800.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,464.98	$ 1,459.66	$ 1,459.3	$ 1,464.25	$ 1,464.98	$ 1,454.09	$ 1,465.08	$ 1,466.23	$ 1,459.66	$ 1,464.98
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	332.9	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43465	43681	45409	43879	44113	45625	43466	45823	44329	44761
Upgrade Package List	Pkg3321201034	Pkg3321202034	Pkg3331201034	Pkg3321203033	Pkg3321301034	Pkg3331202034	Pkg3321201034	Pkg3331203033	Pkg3321302034	Pkg3321401034
GHGI [kg/m2]	3.46	3.46	3.46	3.46	3.46	3.46	3.23	3.47	3.46	3.46
% ICC	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21.7	21.3	21.2	21.7	21.7	20.8	21.7	21.2	21.3	21.7
Output: MEUI [kWh/(m2 * yr)]	31	30.8	30.8	31	31	30.7	29.7	31	30.8	31
Output: Better than ERS (%)	4120.0%	4140.0%	4140.0%	4130.0%	4120.0%	4150.0%	4240.0%	4120.0%	4140.0%	4120.0%
Output: Better than Envelope (%)	4350.0%	4440.0%	4480.0%	4350.0%	4350.0%	4570.0%	4350.0%	4480.0%	4440.0%	4350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2774	2737	2734	2769	2774	2697	2775	2783	2737	2774
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 391.16	$ 385.86	$ 385.49	$ 390.43	$ 391.16	$ 380.31	$ 391.26	$ 392.4	$ 385.86	$ 391.16
Annual savings in carbon tax for electricity [$/year]	$ 1.39	$ 1.37	$ 1.37	$ 1.38	$ 1.39	$ 1.35	$ 1.39	$ 1.39	$ 1.37	$ 1.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 392.55	$ 387.23	$ 386.86	$ 391.81	$ 392.55	$ 381.65	$ 392.65	$ 393.79	$ 387.23	$ 392.55
Annual savings in GHG from electricity savings [kg CO2e/year]	30.5	30.1	30.1	30.5	30.5	29.7	30.5	30.6	30.1	30.5
Annual savings in natural gas [m3/year]	62.43	62.43	62.43	62.43	62.43	62.43	63.52	62.43	62.43	62.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.46	$ 578.46	$ 578.46	$ 578.46	$ 578.46	$ 578.46	$ 588.54	$ 578.46	$ 578.46	$ 578.46
Annual savings in carbon tax for natural gas [$/year]	$ 144.38	$ 144.38	$ 144.38	$ 144.38	$ 144.38	$ 144.38	$ 146.9	$ 144.38	$ 144.38	$ 144.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.84	$ 722.84	$ 722.84	$ 722.84	$ 722.84	$ 722.84	$ 735.43	$ 722.84	$ 722.84	$ 722.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.5	3208.5	3208.5	3208.5	3208.5	3208.5	3264.4	3208.5	3208.5	3208.5
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,263.	$ 10,395.76	$ 10,512.47	$ 10,389.16	$ 10,358.83	$ 10,746.65	$ 10,636.44	$ 10,808.75
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	14.09	8.78	10.51	8.78	14.09	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60	CeilR50	CeilR80	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM 018WWR Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,945.7	$ 17,166.44	$ 17,495.7	$ 17,260.63	$ 17,795.7	$ 17,303.19	$ 17,406.58	$ 17,716.44	$ 17,481.37	$ 17,810.63
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,182.74	$ 18,419.59	$ 18,772.89	$ 18,520.66	$ 19,094.79	$ 18,566.32	$ 18,677.26	$ 19,009.74	$ 18,757.51	$ 19,110.81
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,358.83	$ 10,263.	$ 10,503.6	$ 10,395.76	$ 10,512.47	$ 10,482.99	$ 10,389.16	$ 10,570.24
Incremental dollars per GHG saving	$ 5.33	$ 5.4	$ 5.41	$ 5.43	$ 5.44	$ 5.45	$ 5.48	$ 5.48	$ 5.5	$ 5.51
Auxiliary Energy Required Heating [GJ/yr]	18.3	18	18.3	17.9	18.3	18.3	18.3	18	17.6	17.9
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	13.5	13.5	12.4	13.5	12.4
Annual Energy Space Heating [GJ/yr]	7.6	7.5	7.6	7.5	7.6	7.6	7.6	7.5	7.3	7.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.4	52.2	51.3	52.2	50.6	52.3	52.4	51.1	52.1	51.1
Design Heating Load [W]	5536.6	5467.3	5536.6	5481.7	5536.6	5455.7	5536.6	5467.3	5412.4	5481.7
Annual Energy Electricity [kWh/yr]	10800.7	10763.1	10801.4	10760.5	10801.9	10795.5	10800.7	10763.9	10723.7	10761.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,464.98	$ 1,459.66	$ 1,465.08	$ 1,459.3	$ 1,465.15	$ 1,464.25	$ 1,464.98	$ 1,459.78	$ 1,454.09	$ 1,459.39
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	362.1	314.2	362.1	362.1	332.9	362.1	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 135.53	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 143.6
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43465	43681	43466	45409	43467	43879	44113	43682	45625	45410
Upgrade Package List	Pkg3321201034	Pkg3321202034	Pkg3321201034	Pkg3331201034	Pkg3321201034	Pkg3321203033	Pkg3321301034	Pkg3321202034	Pkg3331202034	Pkg3331201034
GHGI [kg/m2]	3.46	3.46	3.23	3.46	3.07	3.46	3.46	3.22	3.46	3.22
% ICC	3.2%	3.3%	3.3%	3.3%	3.4%	3.3%	3.3%	3.4%	3.3%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21.7	21.3	21.7	21.2	21.7	21.7	21.7	21.3	20.8	21.3
Output: MEUI [kWh/(m2 * yr)]	31	30.8	29.7	30.8	28.9	31	31	29.5	30.7	29.5
Output: Better than ERS (%)	4120.0%	4140.0%	4240.0%	4140.0%	4320.0%	4130.0%	4120.0%	4260.0%	4150.0%	4260.0%
Output: Better than Envelope (%)	4350.0%	4440.0%	4350.0%	4480.0%	4350.0%	4350.0%	4350.0%	4440.0%	4570.0%	4480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2774	2737	2775	2734	2775	2769	2774	2737	2697	2735
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 391.16	$ 385.86	$ 391.26	$ 385.49	$ 391.33	$ 390.43	$ 391.16	$ 385.97	$ 380.31	$ 385.59
Annual savings in carbon tax for electricity [$/year]	$ 1.39	$ 1.37	$ 1.39	$ 1.37	$ 1.39	$ 1.38	$ 1.39	$ 1.37	$ 1.35	$ 1.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 392.55	$ 387.23	$ 392.65	$ 386.86	$ 392.72	$ 391.81	$ 392.55	$ 387.34	$ 381.65	$ 386.96
Annual savings in GHG from electricity savings [kg CO2e/year]	30.5	30.1	30.5	30.1	30.5	30.5	30.5	30.1	29.7	30.1
Annual savings in natural gas [m3/year]	62.43	62.43	63.52	62.43	64.22	62.43	62.43	63.52	62.43	63.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.46	$ 578.46	$ 588.54	$ 578.46	$ 594.99	$ 578.46	$ 578.46	$ 588.54	$ 578.46	$ 588.54
Annual savings in carbon tax for natural gas [$/year]	$ 144.38	$ 144.38	$ 146.9	$ 144.38	$ 148.51	$ 144.38	$ 144.38	$ 146.9	$ 144.38	$ 146.9
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.84	$ 722.84	$ 735.43	$ 722.84	$ 743.5	$ 722.84	$ 722.84	$ 735.43	$ 722.84	$ 735.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.5	3208.5	3264.4	3208.5	3300.2	3208.5	3208.5	3264.4	3208.5	3264.4
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,358.83	$ 10,263.	$ 10,503.6	$ 10,395.76	$ 10,512.47	$ 10,482.99	$ 10,389.16	$ 10,570.24
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	14.09	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR80	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 1,163.13	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.	$ 550.

MEDIUM 018WWR Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,945.7	$ 17,166.44	$ 17,260.63	$ 17,495.7	$ 17,481.37	$ 17,303.19	$ 17,716.44	$ 17,795.7	$ 17,406.58	$ 17,810.63
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,182.74	$ 18,419.59	$ 18,520.66	$ 18,772.89	$ 18,757.51	$ 18,566.32	$ 19,009.74	$ 19,094.79	$ 18,677.26	$ 19,110.81
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,263.	$ 10,358.83	$ 10,389.16	$ 10,395.76	$ 10,482.99	$ 10,503.6	$ 10,512.47	$ 10,570.24
Incremental dollars per GHG saving	$ 5.33	$ 5.4	$ 5.43	$ 5.41	$ 5.5	$ 5.45	$ 5.48	$ 5.44	$ 5.48	$ 5.51
Auxiliary Energy Required Heating [GJ/yr]	18.3	18	17.9	18.3	17.6	18.3	18	18.3	18.3	17.9
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	13.5	12.4	11.7	13.5	12.4
Annual Energy Space Heating [GJ/yr]	7.6	7.5	7.5	7.6	7.3	7.6	7.5	7.6	7.6	7.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.4	52.2	52.2	51.3	52.1	52.3	51.1	50.6	52.4	51.1
Design Heating Load [W]	5536.6	5467.3	5481.7	5536.6	5412.4	5455.7	5467.3	5536.6	5536.6	5481.7
Annual Energy Electricity [kWh/yr]	10800.7	10763.1	10760.5	10801.4	10723.7	10795.5	10763.9	10801.9	10800.7	10761.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,464.98	$ 1,459.66	$ 1,459.3	$ 1,465.08	$ 1,454.09	$ 1,464.25	$ 1,459.78	$ 1,465.15	$ 1,464.98	$ 1,459.39
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	332.9	362.1	362.1	332.9	314.2	362.1	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 143.6	$ 135.53	$ 156.2	$ 143.6
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43465	43681	45409	43466	45625	43879	43682	43467	44113	45410
Upgrade Package List	Pkg3321201034	Pkg3321202034	Pkg3321201034	Pkg3321201034	Pkg3321202034	Pkg3321203033	Pkg3321202034	Pkg3321201034	Pkg3321301034	Pkg3331201034
GHGI [kg/m2]	3.46	3.46	3.46	3.23	3.46	3.46	3.22	3.07	3.46	3.22
% ICC	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.3%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21.7	21.3	21.2	21.7	20.8	21.7	21.3	21.7	21.7	21.3
Output: MEUI [kWh/(m2 * yr)]	31	30.8	30.8	29.7	30.7	31	29.5	28.9	31	29.5
Output: Better than ERS (%)	4120.0%	4140.0%	4140.0%	4240.0%	4150.0%	4130.0%	4260.0%	4320.0%	4120.0%	4260.0%
Output: Better than Envelope (%)	4350.0%	4440.0%	4480.0%	4350.0%	4570.0%	4350.0%	4440.0%	4350.0%	4350.0%	4480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2774	2737	2734	2775	2697	2769	2737	2775	2774	2735
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 391.16	$ 385.86	$ 385.49	$ 391.26	$ 380.31	$ 390.43	$ 385.97	$ 391.33	$ 391.16	$ 385.59
Annual savings in carbon tax for electricity [$/year]	$ 1.39	$ 1.37	$ 1.37	$ 1.39	$ 1.35	$ 1.38	$ 1.37	$ 1.39	$ 1.39	$ 1.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 392.55	$ 387.23	$ 386.86	$ 392.65	$ 381.65	$ 391.81	$ 387.34	$ 392.72	$ 392.55	$ 386.96
Annual savings in GHG from electricity savings [kg CO2e/year]	30.5	30.1	30.1	30.5	29.7	30.5	30.1	30.5	30.5	30.1
Annual savings in natural gas [m3/year]	62.43	62.43	62.43	63.52	62.43	62.43	63.52	64.22	62.43	63.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.46	$ 578.46	$ 578.46	$ 588.54	$ 578.46	$ 578.46	$ 588.54	$ 594.99	$ 578.46	$ 588.54
Annual savings in carbon tax for natural gas [$/year]	$ 144.38	$ 144.38	$ 144.38	$ 146.9	$ 144.38	$ 144.38	$ 146.9	$ 148.51	$ 144.38	$ 146.9
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.84	$ 722.84	$ 722.84	$ 735.43	$ 722.84	$ 722.84	$ 735.43	$ 743.5	$ 722.84	$ 735.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.5	3208.5	3208.5	3264.4	3208.5	3208.5	3264.4	3300.2	3208.5	3264.4
Net Present Value [$]	$ 10,051.59	$ 10,175.56	$ 10,263.	$ 10,358.83	$ 10,389.16	$ 10,395.76	$ 10,482.99	$ 10,503.6	$ 10,512.47	$ 10,570.24
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	14.09	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR80	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 1,163.13	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 018WWR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,500.59	$ 6,600.59	$ 6,721.33	$ 6,815.52	$ 6,821.33	$ 6,915.52	$ 7,036.26	$ 7,050.59	$ 7,100.59	$ 7,136.26
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 7,319.66	$ 7,432.26	$ 7,568.22	$ 7,674.28	$ 7,680.82	$ 7,786.88	$ 7,922.83	$ 7,938.96	$ 7,995.26	$ 8,035.43
Net Present Value [$]	$ 3,487.12	$ 4,250.37	$ 3,383.42	$ 3,305.18	$ 4,150.19	$ 4,068.37	$ 3,201.48	$ 3,254.5	$ 4,838.05	$ 3,967.28
Incremental dollars per GHG saving	$ 3.39	$ 3.09	$ 3.45	$ 3.5	$ 3.16	$ 3.2	$ 3.56	$ 3.54	$ 2.99	$ 3.26
Auxiliary Energy Required Heating [GJ/yr]	38.4	44.3	37.9	37.9	43.8	43.8	37.4	38.4	39.9	43.3
Annual Energy DHW [GJ/yr]	24.6	14.3	24.6	24.6	14.3	14.3	24.6	23.2	14.3	14.3
Annual Energy Space Heating [GJ/yr]	40.7	46.9	40.2	40.1	46.4	46.4	39.6	40.7	42.3	45.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	91.7	87.6	91.2	91.1	87.1	87	90.6	90.2	82.9	86.5
Design Heating Load [W]	9589.6	10204.8	9499.6	9525.3	10114.9	10140.5	9435.4	9589.6	9303.9	10050.6
Annual Energy Electricity [kWh/yr]	7529.6	7561	7527.1	7526.8	7558.4	7558.1	7524.3	7529.6	7537.7	7555.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,002.12	$ 1,006.57	$ 1,001.77	$ 1,001.73	$ 1,006.2	$ 1,006.16	$ 1,001.37	$ 1,002.12	$ 1,003.27	$ 1,005.8
Annual Energy Natural Gas [m3/yr]	1733.4	1620.7	1720.2	1718.4	1607.1	1605.7	1705.2	1695.5	1498	1592.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 747.73	$ 699.11	$ 742.03	$ 741.26	$ 693.25	$ 692.64	$ 735.56	$ 731.38	$ 646.18	$ 686.82
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	1732	11719	13069	2002	3352	13339	11450	11452	3622
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg2131101031	Pkg1121102031	Pkg1131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg1131102031
GHGI [kg/m2]	14.51	13.59	14.4	14.39	13.48	13.47	14.28	14.2	12.59	13.36
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	45.5	52.5	44.9	44.9	51.9	51.9	44.3	45.5	47.3	51.3
Output: MEUI [kWh/(m2 * yr)]	78.3	73.4	77.7	77.6	72.8	72.7	77	76.6	67.9	72.1
Output: Better than ERS (%)	2010.0%	1950.0%	2050.0%	2060.0%	1990.0%	2000.0%	2100.0%	2140.0%	2380.0%	2050.0%
Output: Better than Envelope (%)	1130.0%	230.0%	1250.0%	1250.0%	120.0%	120.0%	1360.0%	1130.0%	790.0%	0.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	628	596	630	630	599	599	633	628	620	602
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 88.49	$ 84.06	$ 88.84	$ 88.89	$ 84.43	$ 84.47	$ 89.24	$ 88.49	$ 87.35	$ 84.83
Annual savings in carbon tax for electricity [$/year]	$ .31	$ .3	$ .32	$ .32	$ .3	$ .3	$ .32	$ .31	$ .31	$ .3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 88.81	$ 84.36	$ 89.16	$ 89.2	$ 84.73	$ 84.77	$ 89.56	$ 88.81	$ 87.66	$ 85.13
Annual savings in GHG from electricity savings [kg CO2e/year]	6.9	6.6	6.9	6.9	6.6	6.6	7	6.9	6.8	6.6
Annual savings in natural gas [m3/year]	37.24	41.44	37.73	37.8	41.95	42	38.29	38.65	46.01	42.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 345.03	$ 383.94	$ 349.59	$ 350.21	$ 388.63	$ 389.11	$ 354.77	$ 358.11	$ 426.29	$ 393.77
Annual savings in carbon tax for natural gas [$/year]	$ 86.12	$ 95.83	$ 87.26	$ 87.41	$ 97.	$ 97.12	$ 88.55	$ 89.38	$ 106.4	$ 98.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 431.15	$ 479.76	$ 436.84	$ 437.62	$ 485.63	$ 486.23	$ 443.31	$ 447.5	$ 532.69	$ 492.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	1913.7	2129.5	1939	1942.5	2155.6	2158.2	1967.7	1986.3	2364.5	2184.1
Net Present Value [$]	$ 3,487.12	$ 4,250.37	$ 3,383.42	$ 3,305.18	$ 4,150.19	$ 4,068.37	$ 3,201.48	$ 3,254.5	$ 4,838.05	$ 3,967.28
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 018WWR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,524.59	$ 10,745.33	$ 10,839.52	$ 11,024.59	$ 11,060.26	$ 11,074.59	$ 11,176.15	$ 11,245.33	$ 11,295.33	$ 9,750.59
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 11,850.69	$ 12,099.24	$ 12,205.3	$ 12,413.69	$ 12,453.85	$ 12,469.99	$ 12,584.34	$ 12,662.24	$ 12,718.54	$ 10,979.16
Net Present Value [$]	$ 7,118.59	$ 7,230.88	$ 7,295.86	$ 6,317.49	$ 7,391.89	$ 7,160.64	$ 7,090.03	$ 6,426.67	$ 7,268.91	$ 2,540.57
Incremental dollars per GHG saving	$ 2.04	$ 2.09	$ 2.11	$ 2.14	$ 2.15	$ 2.15	$ 2.17	$ 2.18	$ 2.19	$ 2.19
Auxiliary Energy Required Heating [GJ/yr]	48.4	47.9	47.9	44	47.4	48.1	48.2	43.5	47.6	44.2
Annual Energy DHW [GJ/yr]	8.2	8.2	8.2	8.2	8.2	7.6	8.2	8.2	7.6	14.3
Annual Energy Space Heating [GJ/yr]	19.7	19.5	19.5	17.9	19.3	19.6	19.3	17.7	19.4	18.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	56.6	56.5	56.4	54.8	56.2	55.9	55.7	54.6	55.7	61.1
Design Heating Load [W]	10577.2	10487.3	10512.9	9668.5	10423	10577.2	9668.5	9578.5	10487.3	10285.5
Annual Energy Electricity [kWh/yr]	15726	15683.9	15672.5	15220.6	15624.1	15528.7	15461.8	15177.3	15485	13003.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,161.91	$ 2,155.96	$ 2,154.34	$ 2,090.4	$ 2,147.5	$ 2,134.	$ 2,124.53	$ 2,084.27	$ 2,127.81	$ 1,776.64
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1744	2014	3364	11464	3634	1745	11410	11734	2015	1741
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg2121101031	Pkg1131102031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg1121102031	Pkg1121101031
GHGI [kg/m2]	0.74	0.74	0.74	0.71	0.73	0.73	0.73	0.71	0.73	3.74
% ICC	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	57.4	56.8	56.8	52.1	56.2	57	57.1	51.5	56.5	52.4
Output: MEUI [kWh/(m2 * yr)]	36.3	36.1	36.1	34.2	35.9	35.5	35.3	34	35.3	41.6
Output: Better than ERS (%)	4800.0%	4810.0%	4820.0%	4960.0%	4830.0%	4860.0%	4880.0%	4980.0%	4880.0%	4360.0%
Output: Better than Envelope (%)	1180.0%	1060.0%	1060.0%	160.0%	950.0%	1110.0%	1130.0%	50.0%	990.0%	210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7569	7527	7515	7063	7467	7372	7305	7020	7328	4846
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,067.2	$ 1,061.26	$ 1,059.66	$ 995.94	$ 1,052.83	$ 1,039.38	$ 1,029.95	$ 989.83	$ 1,033.22	$ 683.29
Annual savings in carbon tax for electricity [$/year]	$ 3.78	$ 3.76	$ 3.76	$ 3.53	$ 3.73	$ 3.69	$ 3.65	$ 3.51	$ 3.66	$ 2.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,070.99	$ 1,065.03	$ 1,063.41	$ 999.47	$ 1,056.57	$ 1,043.07	$ 1,033.6	$ 993.34	$ 1,036.88	$ 685.71
Annual savings in GHG from electricity savings [kg CO2e/year]	83.3	82.8	82.7	77.7	82.1	81.1	80.4	77.2	80.6	53.3
Annual savings in natural gas [m3/year]	101.82	101.82	101.82	101.82	101.82	101.82	101.82	101.82	101.82	87.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 943.41	$ 811.3
Annual savings in carbon tax for natural gas [$/year]	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 235.47	$ 202.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,178.88	$ 1,013.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	5232.7	5232.7	5232.7	5232.7	5232.7	5232.7	5232.7	5232.7	5232.7	4499.9
Net Present Value [$]	$ 7,118.59	$ 7,230.88	$ 7,295.86	$ 6,317.49	$ 7,391.89	$ 7,160.64	$ 7,090.03	$ 6,426.67	$ 7,268.91	$ 2,540.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.

MEDIUM 018WWR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 7,100.59	$ 7,321.33	$ 7,415.52	$ 7,650.59	$ 7,636.26	$ 7,871.33	$ 7,950.59	$ 7,965.52	$ 8,171.33	$ 8,563.63
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 7,995.26	$ 8,243.82	$ 8,349.88	$ 8,614.56	$ 8,598.43	$ 8,863.12	$ 8,952.36	$ 8,969.18	$ 9,200.92	$ 9,642.65
Net Present Value [$]	$ 4,838.05	$ 4,736.77	$ 4,655.2	$ 4,556.72	$ 4,554.11	$ 4,455.62	$ 4,430.94	$ 4,373.87	$ 4,329.66	$ 4,328.66
Incremental dollars per GHG saving	$ 2.99	$ 3.05	$ 3.09	$ 3.15	$ 3.15	$ 3.2	$ 3.22	$ 3.24	$ 3.27	$ 3.32
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.4	39.4	39.9	38.9	39.5	39.9	39.4	39.5	36.1
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	13	12.3	13	12.3	14.3
Annual Energy Space Heating [GJ/yr]	42.3	41.8	41.7	42.3	41.2	41.8	42.3	41.7	41.8	38.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	82.9	82.4	82.4	81.7	81.8	81.2	81	81.2	80.4	78.8
Design Heating Load [W]	9303.9	9213.9	9239.6	9303.9	9149.7	9213.9	9303.9	9239.6	9213.9	8815.4
Annual Energy Electricity [kWh/yr]	7537.7	7535.2	7534.9	7537.8	7532.4	7535.2	7537.8	7535	7535.3	7517.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,003.27	$ 1,002.92	$ 1,002.87	$ 1,003.28	$ 1,002.52	$ 1,002.92	$ 1,003.28	$ 1,002.89	$ 1,002.93	$ 1,000.4
Annual Energy Natural Gas [m3/yr]	1498	1484.5	1483.1	1465.9	1469.6	1452.4	1445.1	1451	1431.6	1390.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 646.18	$ 640.36	$ 639.76	$ 632.34	$ 633.93	$ 626.51	$ 623.37	$ 625.91	$ 617.54	$ 599.77
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	11453	13342	11723	11454	13073	11724	17824
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2221101031
GHGI [kg/m2]	12.59	12.48	12.47	12.33	12.36	12.22	12.16	12.21	12.05	11.71
% ICC	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	47.3	46.7	46.7	47.3	46.1	46.8	47.3	46.7	46.8	42.8
Output: MEUI [kWh/(m2 * yr)]	67.9	67.3	67.2	66.5	66.6	65.9	65.6	65.8	65	63.1
Output: Better than ERS (%)	2380.0%	2430.0%	2430.0%	2490.0%	2480.0%	2540.0%	2560.0%	2540.0%	2610.0%	2760.0%
Output: Better than Envelope (%)	790.0%	900.0%	900.0%	790.0%	1020.0%	880.0%	790.0%	900.0%	880.0%	1660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	620	622	622	619	625	622	619	622	622	640
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 87.35	$ 87.7	$ 87.74	$ 87.34	$ 88.1	$ 87.7	$ 87.34	$ 87.73	$ 87.69	$ 90.21
Annual savings in carbon tax for electricity [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 87.66	$ 88.01	$ 88.06	$ 87.65	$ 88.41	$ 88.01	$ 87.65	$ 88.04	$ 88.	$ 90.53
Annual savings in GHG from electricity savings [kg CO2e/year]	6.8	6.8	6.8	6.8	6.9	6.8	6.8	6.8	6.8	7
Annual savings in natural gas [m3/year]	46.01	46.51	46.57	47.21	47.07	47.71	47.98	47.76	48.49	50.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 426.29	$ 430.95	$ 431.44	$ 437.37	$ 436.1	$ 442.03	$ 444.55	$ 442.52	$ 449.21	$ 463.44
Annual savings in carbon tax for natural gas [$/year]	$ 106.4	$ 107.56	$ 107.68	$ 109.17	$ 108.85	$ 110.33	$ 110.96	$ 110.45	$ 112.12	$ 115.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 532.69	$ 538.52	$ 539.12	$ 546.54	$ 544.94	$ 552.36	$ 555.51	$ 552.97	$ 561.34	$ 579.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	2364.5	2390.3	2393	2425.9	2418.8	2451.8	2465.7	2454.4	2491.6	2570.5
Net Present Value [$]	$ 4,838.05	$ 4,736.77	$ 4,655.2	$ 4,556.72	$ 4,554.11	$ 4,455.62	$ 4,430.94	$ 4,373.87	$ 4,329.66	$ 4,328.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

MEDIUM 018WWR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,650.59	$ 9,871.33	$ 9,965.52	$ 10,186.26	$ 10,200.59	$ 10,421.33	$ 10,500.59	$ 10,515.52	$ 10,721.33	$ 10,736.26
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 10,866.56	$ 11,115.12	$ 11,221.18	$ 11,469.73	$ 11,485.86	$ 11,734.42	$ 11,823.66	$ 11,840.48	$ 12,072.22	$ 12,089.03
Net Present Value [$]	$ 3,230.76	$ 3,337.21	$ 3,403.9	$ 3,492.14	$ 3,462.41	$ 3,569.82	$ 3,556.41	$ 3,636.52	$ 3,663.58	$ 3,724.51
Incremental dollars per GHG saving	$ 2.46	$ 2.52	$ 2.54	$ 2.6	$ 2.56	$ 2.61	$ 2.6	$ 2.63	$ 2.65	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	38.3	37.8	37.8	37.3	38.3	37.8	38.3	37.8	37.8	37.3
Annual Energy DHW [GJ/yr]	24.6	24.6	24.6	24.6	23.2	23.2	22.3	23.2	22.3	23.2
Annual Energy Space Heating [GJ/yr]	15.8	15.7	15.6	15.5	15.8	15.7	15.8	15.6	15.7	15.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	69.3	69.1	69.1	68.9	67.9	67.7	67	67.7	66.8	67.5
Design Heating Load [W]	9668.5	9578.5	9604.2	9514.3	9668.5	9578.5	9668.5	9604.2	9578.5	9514.3
Annual Energy Electricity [kWh/yr]	12403.4	12359	12349.6	12297.8	12403.4	12359	12403.4	12349.6	12359	12297.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,691.77	$ 1,685.48	$ 1,684.15	$ 1,676.82	$ 1,691.77	$ 1,685.48	$ 1,691.77	$ 1,684.15	$ 1,685.48	$ 1,676.82
Annual Energy Natural Gas [m3/yr]	661.4	661.4	661	661.1	623.4	623.5	598.8	623.1	598.9	623.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.3	$ 285.3	$ 285.13	$ 285.18	$ 268.91	$ 268.96	$ 258.3	$ 268.78	$ 258.34	$ 268.83
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11458	11728	13078	13348	11459	11729	11460	13079	11730	13349
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031
GHGI [kg/m2]	5.98	5.98	5.98	5.98	5.67	5.67	5.47	5.67	5.47	5.67
% ICC	1.8%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.4	44.8	44.8	44.2	45.4	44.8	45.4	44.8	44.8	44.2
Output: MEUI [kWh/(m2 * yr)]	51.3	51.2	51.1	50.9	49.7	49.5	48.6	49.4	48.4	49.2
Output: Better than ERS (%)	3940.0%	3960.0%	3960.0%	3980.0%	4060.0%	4080.0%	4140.0%	4080.0%	4160.0%	4100.0%
Output: Better than Envelope (%)	1150.0%	1270.0%	1270.0%	1390.0%	1150.0%	1270.0%	1150.0%	1270.0%	1270.0%	1390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4246	4202	4192	4141	4246	4202	4246	4192	4202	4141
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 598.71	$ 592.45	$ 591.13	$ 583.82	$ 598.71	$ 592.45	$ 598.71	$ 591.13	$ 592.45	$ 583.82
Annual savings in carbon tax for electricity [$/year]	$ 2.12	$ 2.1	$ 2.1	$ 2.07	$ 2.12	$ 2.1	$ 2.12	$ 2.1	$ 2.1	$ 2.07
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 600.84	$ 594.55	$ 593.22	$ 585.89	$ 600.84	$ 594.55	$ 600.84	$ 593.22	$ 594.55	$ 585.89
Annual savings in GHG from electricity savings [kg CO2e/year]	46.7	46.2	46.1	45.5	46.7	46.2	46.7	46.1	46.2	45.5
Annual savings in natural gas [m3/year]	77.18	77.18	77.2	77.19	78.6	78.59	79.51	78.61	79.51	78.61
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 715.09	$ 715.09	$ 715.23	$ 715.19	$ 728.21	$ 728.17	$ 736.7	$ 728.31	$ 736.67	$ 728.28
Annual savings in carbon tax for natural gas [$/year]	$ 178.48	$ 178.48	$ 178.52	$ 178.51	$ 181.76	$ 181.75	$ 183.88	$ 181.78	$ 183.87	$ 181.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 893.57	$ 893.57	$ 893.75	$ 893.7	$ 909.96	$ 909.92	$ 920.58	$ 910.09	$ 920.53	$ 910.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	3966.3	3966.3	3967.1	3966.9	4039	4038.9	4086.1	4039.6	4086	4039.4
Net Present Value [$]	$ 3,230.76	$ 3,337.21	$ 3,403.9	$ 3,492.14	$ 3,462.41	$ 3,569.82	$ 3,556.41	$ 3,636.52	$ 3,663.58	$ 3,724.51
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.

MEDIUM 018WWR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,786.26	$ 9,650.59	$ 11,336.26	$ 9,871.33	$ 9,965.52	$ 11,636.26	$ 10,200.59	$ 10,186.26	$ 10,500.59	$ 11,610.59
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 12,145.33	$ 10,866.56	$ 12,764.63	$ 11,115.12	$ 11,221.18	$ 13,102.43	$ 11,485.86	$ 11,469.73	$ 11,823.66	$ 13,073.52
Net Present Value [$]	$ 2,034.31	$ 3,230.76	$ 2,316.32	$ 3,337.21	$ 3,403.9	$ 2,442.04	$ 3,462.41	$ 3,492.14	$ 3,556.41	$ 3,444.56
Incremental dollars per GHG saving	$ 2.42	$ 2.46	$ 2.51	$ 2.52	$ 2.54	$ 2.55	$ 2.56	$ 2.6	$ 2.6	$ 2.61
Auxiliary Energy Required Heating [GJ/yr]	38.8	38.3	38.8	37.8	37.8	38.8	38.3	37.3	38.3	38.2
Annual Energy DHW [GJ/yr]	14.3	24.6	13	24.6	24.6	12.3	23.2	24.6	22.3	14.3
Annual Energy Space Heating [GJ/yr]	16	15.8	16	15.7	15.6	16	15.8	15.5	15.8	15.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7
Total Energy [GJ/yr]	58.9	69.3	57.7	69.1	69.1	56.9	67.9	68.9	67	59.7
Design Heating Load [W]	9227.2	9668.5	9227.2	9578.5	9604.2	9227.2	9668.5	9514.3	9668.5	8687.4
Annual Energy Electricity [kWh/yr]	12404.3	12403.4	12405.3	12359	12349.6	12405.9	12403.4	12297.8	12403.4	12631.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,691.89	$ 1,691.77	$ 1,692.03	$ 1,685.48	$ 1,684.15	$ 1,692.12	$ 1,691.77	$ 1,676.82	$ 1,691.77	$ 1,724.1
Annual Energy Natural Gas [m3/yr]	382.7	661.4	350.4	661.4	661	329.4	623.4	661.1	598.8	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 285.3	$ 151.15	$ 285.3	$ 285.13	$ 142.09	$ 268.91	$ 285.18	$ 258.3	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	13351	11458	13352	11728	13078	13353	11459	13348	11460	11479
Upgrade Package List	Pkg2131102031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2131102031	Pkg2121101031	Pkg2121101032
GHGI [kg/m2]	3.71	5.98	3.44	5.98	5.98	3.27	5.67	5.98	5.47	3.72
% ICC	2.1%	1.8%	2.2%	1.9%	1.9%	2.2%	2.0%	1.9%	2.0%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46	45.4	46	44.8	44.8	46	45.4	44.2	45.4	45.3
Output: MEUI [kWh/(m2 * yr)]	39	51.3	37.6	51.2	51.1	36.7	49.7	50.9	48.6	40
Output: Better than ERS (%)	4560.0%	3940.0%	4670.0%	3960.0%	3960.0%	4750.0%	4060.0%	3980.0%	4140.0%	4490.0%
Output: Better than Envelope (%)	1040.0%	1150.0%	1040.0%	1270.0%	1270.0%	1040.0%	1150.0%	1390.0%	1150.0%	1180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4247	4246	4248	4202	4192	4249	4246	4141	4246	4475
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 598.84	$ 598.71	$ 598.98	$ 592.45	$ 591.13	$ 599.07	$ 598.71	$ 583.82	$ 598.71	$ 630.93
Annual savings in carbon tax for electricity [$/year]	$ 2.12	$ 2.12	$ 2.12	$ 2.1	$ 2.1	$ 2.12	$ 2.12	$ 2.07	$ 2.12	$ 2.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 600.96	$ 600.84	$ 601.11	$ 594.55	$ 593.22	$ 601.19	$ 600.84	$ 585.89	$ 600.84	$ 633.17
Annual savings in GHG from electricity savings [kg CO2e/year]	46.7	46.7	46.7	46.2	46.1	46.7	46.7	45.5	46.7	49.2
Annual savings in natural gas [m3/year]	87.57	77.18	88.77	77.18	77.2	89.55	78.6	77.19	79.51	87.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 811.3	$ 715.09	$ 822.45	$ 715.09	$ 715.23	$ 829.7	$ 728.21	$ 715.19	$ 736.7	$ 811.3
Annual savings in carbon tax for natural gas [$/year]	$ 202.5	$ 178.48	$ 205.28	$ 178.48	$ 178.52	$ 207.09	$ 181.76	$ 178.51	$ 183.88	$ 202.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,013.79	$ 893.57	$ 1,027.73	$ 893.57	$ 893.75	$ 1,036.79	$ 909.96	$ 893.7	$ 920.58	$ 1,013.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	4499.9	3966.3	4561.8	3966.3	3967.1	4602	4039	3966.9	4086.1	4499.9
Net Present Value [$]	$ 2,034.31	$ 3,230.76	$ 2,316.32	$ 3,337.21	$ 3,403.9	$ 2,442.04	$ 3,462.41	$ 3,492.14	$ 3,556.41	$ 3,444.56
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$ 850.	$.

MEDIUM 018WWR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,295.7	$ 13,516.44	$ 13,391.08	$ 13,370.34	$ 13,356.01	$ 13,610.63	$ 13,406.01	$ 13,795.7	$ 13,405.7	$ 13,485.27
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 14,970.96	$ 15,219.51	$ 15,078.36	$ 15,055.	$ 15,038.87	$ 15,325.57	$ 15,095.17	$ 15,533.96	$ 15,094.82	$ 15,184.41
Net Present Value [$]	$ 864.46	$ 759.79	$ 699.05	$ 689.78	$ 675.89	$ 672.94	$ 634.03	$ 624.44	$ 620.08	$ 612.74
Incremental dollars per GHG saving	$ 4.44	$ 4.47	$ 4.48	$ 4.49	$ 4.5	$ 4.5	$ 4.51	$ 4.52	$ 4.51	$ 4.51
Auxiliary Energy Required Heating [GJ/yr]	28.2	27.7	30.3	29.7	28.7	27.7	29.8	27.2	29.8	30.3
Annual Energy DHW [GJ/yr]	14.3	14.3	12.3	13	14.3	14.3	13	14.3	13	12.3
Annual Energy Space Heating [GJ/yr]	29.9	29.4	32.1	31.5	30.4	29.3	31.5	28.8	31.6	32
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	71.5	71	71.7	71.8	72	70.9	71.9	70.3	72	71.6
Design Heating Load [W]	7161.7	7071.8	7407.6	7459.6	7305.5	7097.4	7343.3	7123.8	7338.3	7433.2
Annual Energy Electricity [kWh/yr]	7740.7	7738.2	7751.7	7748.6	7743.4	7738	7749	7735.1	7749.3	7751.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,031.99	$ 1,031.64	$ 1,033.55	$ 1,033.11	$ 1,032.38	$ 1,031.61	$ 1,033.17	$ 1,031.2	$ 1,033.21	$ 1,033.52
Annual Energy Natural Gas [m3/yr]	1170.4	1157.3	1175.4	1179.9	1184.9	1156.5	1182.2	1141.1	1183.8	1174.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 504.87	$ 499.22	$ 507.03	$ 508.97	$ 511.12	$ 498.87	$ 509.96	$ 492.23	$ 510.65	$ 506.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43438	43654	35880	35681	37840	45382	37823	43456	43421	37608
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3221202033	Pkg3221201034	Pkg3231202034	Pkg3331201033	Pkg3231202033	Pkg3321201034	Pkg3321201032	Pkg3231201033
GHGI [kg/m2]	9.92	9.82	9.97	10	10.04	9.81	10.02	9.68	10.03	9.96
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.4	32.9	35.9	35.2	34	32.8	35.3	32.2	35.4	35.9
Output: MEUI [kWh/(m2 * yr)]	54.3	53.7	54.6	54.8	55	53.7	54.9	53	54.9	54.5
Output: Better than ERS (%)	3430.0%	3470.0%	3410.0%	3400.0%	3380.0%	3480.0%	3390.0%	3540.0%	3380.0%	3420.0%
Output: Better than Envelope (%)	3490.0%	3600.0%	3000.0%	3140.0%	3370.0%	3600.0%	3120.0%	3720.0%	3120.0%	3000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	416	419	406	409	414	419	408	422	408	406
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 58.73	$ 59.08	$ 57.18	$ 57.61	$ 58.35	$ 59.11	$ 57.56	$ 59.52	$ 57.51	$ 57.2
Annual savings in carbon tax for electricity [$/year]	$ .21	$ .21	$ .2	$ .2	$ .21	$ .21	$ .2	$ .21	$ .2	$ .2
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 58.93	$ 59.29	$ 57.38	$ 57.82	$ 58.55	$ 59.32	$ 57.76	$ 59.73	$ 57.72	$ 57.41
Annual savings in GHG from electricity savings [kg CO2e/year]	4.6	4.6	4.5	4.5	4.6	4.6	4.5	4.6	4.5	4.5
Annual savings in natural gas [m3/year]	58.22	58.71	58.03	57.86	57.68	58.73	57.78	59.31	57.72	58.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 539.38	$ 543.9	$ 537.66	$ 536.1	$ 534.38	$ 544.18	$ 535.31	$ 549.5	$ 534.76	$ 537.97
Annual savings in carbon tax for natural gas [$/year]	$ 134.63	$ 135.76	$ 134.2	$ 133.81	$ 133.38	$ 135.82	$ 133.61	$ 137.15	$ 133.47	$ 134.27
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 674.01	$ 679.66	$ 671.85	$ 669.91	$ 667.75	$ 680.	$ 668.92	$ 686.65	$ 668.23	$ 672.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	2991.7	3016.8	2982.1	2973.5	2963.9	3018.3	2969.1	3047.8	2966.1	2983.9
Net Present Value [$]	$ 864.46	$ 759.79	$ 699.05	$ 689.78	$ 675.89	$ 672.94	$ 634.03	$ 624.44	$ 620.08	$ 612.74
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	10.51	8.78	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	5.28	5.28	5.28	7.04	5.28	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 5,588.	$ 4,612.64	$ 5,588.	$ 5,588.	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$ 550.	$.	$.	$ 550.	$.	$ 550.	$ 850.

MEDIUM 018WWR Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,068.12	$ 18,173.76	$ 18,368.12	$ 18,392.25	$ 18,473.76	$ 18,529.	$ 18,577.32	$ 18,634.64	$ 18,688.53	$ 18,692.25
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 20,344.7	$ 20,463.65	$ 20,682.5	$ 20,709.67	$ 20,801.45	$ 20,863.65	$ 20,918.06	$ 20,982.6	$ 21,043.28	$ 21,047.47
Net Present Value [$]	$ 8,191.53	$ 8,368.26	$ 8,285.52	$ 8,412.75	$ 8,462.26	$ 8,652.41	$ 8,477.85	$ 8,829.14	$ 8,709.03	$ 8,506.74
Incremental dollars per GHG saving	$ 4.51	$ 4.54	$ 4.53	$ 4.59	$ 4.56	$ 4.63	$ 4.64	$ 4.65	$ 4.67	$ 4.61
Auxiliary Energy Required Heating [GJ/yr]	24.2	24.5	24.2	24.1	24.5	24.2	23.5	24.5	24.1	24.1
Annual Energy DHW [GJ/yr]	23.2	23.2	22.3	23.2	22.3	23.2	23.3	23.2	23.2	22.3
Annual Energy Space Heating [GJ/yr]	10.4	10.5	10.4	10.2	10.5	10.4	10	10.5	10.2	10.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	63.5	63.6	62.6	63.3	62.7	63.5	63.2	63.6	63.3	62.4
Design Heating Load [W]	7266.1	7274.2	7266.1	6968.3	7274.2	7266.1	6994.7	7274.2	6968.3	6968.3
Annual Energy Electricity [kWh/yr]	11181.7	11210.6	11181.7	11142.7	11210.6	11181.7	11094.4	11210.6	11142.7	11142.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,518.9	$ 1,522.98	$ 1,518.9	$ 1,513.38	$ 1,522.98	$ 1,518.9	$ 1,506.54	$ 1,522.98	$ 1,513.38	$ 1,513.38
Annual Energy Natural Gas [m3/yr]	624.2	623.8	599.6	623.9	599.2	624.2	624.4	623.8	623.9	599.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 269.26	$ 269.09	$ 258.65	$ 269.13	$ 258.47	$ 269.26	$ 269.34	$ 269.09	$ 269.13	$ 258.52
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45839	47567	45840	51563	47568	46487	51005	48215	51851	51564
Upgrade Package List	Pkg3331203034	Pkg3341202034	Pkg3331203034	Pkg4331302033	Pkg3341202034	Pkg3331303034	Pkg4321302034	Pkg3341302034	Pkg4331402033	Pkg4331302033
GHGI [kg/m2]	5.62	5.62	5.42	5.62	5.42	5.62	5.62	5.62	5.62	5.42
% ICC	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Chosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.7	29	28.7	28.5	29	28.7	27.9	29	28.5	28.5
Output: MEUI [kWh/(m2 * yr)]	44.5	44.6	43.4	44.3	43.5	44.5	44.1	44.6	44.3	43.2
Output: Better than ERS (%)	4450.0%	4440.0%	4530.0%	4470.0%	4520.0%	4450.0%	4480.0%	4440.0%	4470.0%	4550.0%
Output: Better than Envelope (%)	4410.0%	4340.0%	4410.0%	4430.0%	4340.0%	4410.0%	4570.0%	4340.0%	4430.0%	4430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3024	3053	3024	2986	3053	3024	2937	3053	2986	2986
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 426.45	$ 430.53	$ 426.45	$ 420.96	$ 430.53	$ 426.45	$ 414.15	$ 430.53	$ 420.96	$ 420.96
Annual savings in carbon tax for electricity [$/year]	$ 1.51	$ 1.53	$ 1.51	$ 1.49	$ 1.53	$ 1.51	$ 1.47	$ 1.53	$ 1.49	$ 1.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 427.97	$ 432.06	$ 427.97	$ 422.45	$ 432.06	$ 427.97	$ 415.61	$ 432.06	$ 422.45	$ 422.45
Annual savings in GHG from electricity savings [kg CO2e/year]	33.3	33.6	33.3	32.8	33.6	33.3	32.3	33.6	32.8	32.8
Annual savings in natural gas [m3/year]	78.57	78.58	79.48	78.58	79.5	78.57	78.56	78.58	78.58	79.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 727.93	$ 728.07	$ 736.42	$ 728.04	$ 736.56	$ 727.93	$ 727.86	$ 728.07	$ 728.04	$ 736.53
Annual savings in carbon tax for natural gas [$/year]	$ 181.69	$ 181.72	$ 183.81	$ 181.71	$ 183.84	$ 181.69	$ 181.67	$ 181.72	$ 181.71	$ 183.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 909.62	$ 909.79	$ 920.23	$ 909.75	$ 920.4	$ 909.62	$ 909.53	$ 909.79	$ 909.75	$ 920.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	4037.5	4038.3	4084.6	4038.1	4085.4	4037.5	4037.1	4038.3	4038.1	4085.2
Net Present Value [$]	$ 8,191.53	$ 8,368.26	$ 8,285.52	$ 8,412.75	$ 8,462.26	$ 8,652.41	$ 8,477.85	$ 8,829.14	$ 8,709.03	$ 8,506.74
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	14.09	10.51	10.51	14.09	10.51	10.51	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 1,286.55	$ 544.16	$ 544.16	$ 1,286.55	$ 544.16	$ 229.23	$ 1,286.55	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.

MEDIUM 018WWR Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 19,264.07	$ 19,814.07	$ 19,560.35	$ 19,579.	$ 20,114.07	$ 19,684.64	$ 20,110.35	$ 20,129.	$ 19,875.28	$ 20,410.35
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 21,691.34	$ 22,310.64	$ 22,024.95	$ 22,045.95	$ 22,648.44	$ 22,164.9	$ 22,644.25	$ 22,665.25	$ 22,379.57	$ 22,982.05
Net Present Value [$]	$ 7,303.55	$ 7,585.19	$ 7,599.83	$ 7,489.21	$ 7,710.74	$ 7,664.97	$ 7,881.47	$ 7,771.04	$ 7,785.49	$ 8,007.02
Incremental dollars per GHG saving	$ 4.31	$ 4.38	$ 4.38	$ 4.38	$ 4.4	$ 4.41	$ 4.44	$ 4.44	$ 4.45	$ 4.47
Auxiliary Energy Required Heating [GJ/yr]	24.4	24.4	24.4	23.9	24.4	24.2	24.4	23.9	23.9	24.4
Annual Energy DHW [GJ/yr]	14.3	13	14.3	14.3	12.3	14.3	13	13	14.3	12.3
Annual Energy Space Heating [GJ/yr]	10.3	10.3	10.3	10.1	10.3	10.2	10.3	10.1	10.1	10.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	54.4	53.2	54.4	54.2	52.4	54.3	53.2	53	54.2	52.4
Design Heating Load [W]	6695.1	6695.1	6695.1	6630.9	6695.1	6639	6695.1	6630.9	6630.9	6695.1
Annual Energy Electricity [kWh/yr]	11158	11158.8	11158	11107.8	11159.4	11135	11158.8	11108.7	11107.8	11159.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,515.54	$ 1,515.66	$ 1,515.54	$ 1,508.44	$ 1,515.74	$ 1,512.29	$ 1,515.66	$ 1,508.57	$ 1,508.44	$ 1,515.74
Annual Energy Natural Gas [m3/yr]	382.7	350.4	382.7	382.7	329.4	382.7	350.4	350.4	382.7	329.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 165.08	$ 151.15	$ 151.15	$ 165.08	$ 142.09
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51151	51152	51439	51727	51153	52159	51440	51728	52015	51441
Upgrade Package List	Pkg4321303034	Pkg4321303034	Pkg4321403034	Pkg4331303034	Pkg4321303034	Pkg4341302034	Pkg4321403034	Pkg4331303034	Pkg4331403034	Pkg4321403034
GHGI [kg/m2]	3.65	3.39	3.65	3.65	3.21	3.65	3.39	3.38	3.65	3.21
% ICC	3.7%	3.8%	3.7%	3.7%	3.8%	3.8%	3.8%	3.9%	3.8%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.9	28.9	28.9	28.3	28.9	28.7	28.9	28.4	28.3	28.9
Output: MEUI [kWh/(m2 * yr)]	33.7	32.3	33.7	33.5	31.4	33.6	32.3	32.1	33.5	31.4
Output: Better than ERS (%)	4980.0%	5090.0%	4980.0%	5000.0%	5160.0%	4990.0%	5090.0%	5110.0%	5000.0%	5160.0%
Output: Better than Envelope (%)	4360.0%	4360.0%	4360.0%	4480.0%	4360.0%	4410.0%	4360.0%	4480.0%	4480.0%	4360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3001	3002	3001	2951	3002	2978	3002	2952	2951	3002
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 423.11	$ 423.23	$ 423.11	$ 416.03	$ 423.31	$ 419.87	$ 423.23	$ 416.16	$ 416.03	$ 423.31
Annual savings in carbon tax for electricity [$/year]	$ 1.5	$ 1.5	$ 1.5	$ 1.48	$ 1.5	$ 1.49	$ 1.5	$ 1.48	$ 1.48	$ 1.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 424.61	$ 424.73	$ 424.61	$ 417.51	$ 424.81	$ 421.36	$ 424.73	$ 417.64	$ 417.51	$ 424.81
Annual savings in GHG from electricity savings [kg CO2e/year]	33	33	33	32.5	33	32.8	33	32.5	32.5	33
Annual savings in natural gas [m3/year]	87.57	88.77	87.57	87.57	89.55	87.57	88.77	88.77	87.57	89.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 811.3	$ 822.45	$ 811.3	$ 811.3	$ 829.7	$ 811.3	$ 822.45	$ 822.45	$ 811.3	$ 829.7
Annual savings in carbon tax for natural gas [$/year]	$ 202.5	$ 205.28	$ 202.5	$ 202.5	$ 207.09	$ 202.5	$ 205.28	$ 205.28	$ 202.5	$ 207.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,013.79	$ 1,027.73	$ 1,013.79	$ 1,013.79	$ 1,036.79	$ 1,013.79	$ 1,027.73	$ 1,027.73	$ 1,013.79	$ 1,036.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	4499.9	4561.8	4499.9	4499.9	4602	4499.9	4561.8	4561.8	4499.9	4602
Net Present Value [$]	$ 7,303.55	$ 7,585.19	$ 7,599.83	$ 7,489.21	$ 7,710.74	$ 7,664.97	$ 7,881.47	$ 7,771.04	$ 7,785.49	$ 8,007.02
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	10.51	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 1,286.55	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$.	$ 550.	$ 550.	$.	$ 850.

MEDIUM 018WWR Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k	Medium 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,078.15	$ 19,264.07	$ 24,374.43	$ 19,579.	$ 19,814.07	$ 19,560.35	$ 19,684.64	$ 20,114.07	$ 24,820.54	$ 20,129.
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 27,112.	$ 21,691.34	$ 27,445.61	$ 22,045.95	$ 22,310.64	$ 22,024.95	$ 22,164.9	$ 22,648.44	$ 27,947.93	$ 22,665.25
Net Present Value [$]	$ 7,069.56	$ 7,303.55	$ 7,365.84	$ 7,489.21	$ 7,585.19	$ 7,599.83	$ 7,664.97	$ 7,710.74	$ 7,733.07	$ 7,771.04
Incremental dollars per GHG saving	$ 6.66	$ 4.31	$ 6.74	$ 4.38	$ 4.38	$ 4.38	$ 4.41	$ 4.4	$ 6.83	$ 4.44
Auxiliary Energy Required Heating [GJ/yr]	18.5	24.4	18.5	23.9	24.4	24.4	24.2	24.4	18.2	23.9
Annual Energy DHW [GJ/yr]	12.3	14.3	12.3	14.3	13	14.3	14.3	12.3	12.3	13
Annual Energy Space Heating [GJ/yr]	19.6	10.3	19.6	10.1	10.3	10.3	10.2	10.3	19.3	10.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	59.2	54.4	59.2	54.2	53.2	54.4	54.3	52.4	58.9	53
Design Heating Load [W]	5813.5	6695.1	5813.5	6630.9	6695.1	6695.1	6639	6695.1	5768.6	6630.9
Annual Energy Electricity [kWh/yr]	7689.4	11158	7689.4	11107.8	11158.8	11158	11135	11159.4	7687.7	11108.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,024.74	$ 1,515.54	$ 1,024.74	$ 1,508.44	$ 1,515.66	$ 1,515.54	$ 1,512.29	$ 1,515.74	$ 1,024.49	$ 1,508.57
Annual Energy Natural Gas [m3/yr]	846.1	382.7	846.1	382.7	350.4	382.7	382.7	329.4	837.2	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 364.98	$ 165.08	$ 364.98	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 361.14	$ 151.15
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51792	51151	52080	51727	51152	51439	52159	51153	52368	51728
Upgrade Package List	Pkg4331303054	Pkg4321303034	Pkg4331403054	Pkg4331303034	Pkg4321303034	Pkg4321403034	Pkg4341302034	Pkg4321303034	Pkg4341303054	Pkg4331303034
GHGI [kg/m2]	7.27	3.65	7.27	3.65	3.39	3.65	3.65	3.21	7.2	3.38
% ICC	4.6%	3.7%	4.7%	3.7%	3.8%	3.7%	3.8%	3.8%	4.7%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.9	28.9	21.9	28.3	28.9	28.9	28.7	28.9	21.5	28.4
Output: MEUI [kWh/(m2 * yr)]	39.8	33.7	39.8	33.5	32.3	33.7	33.6	31.4	39.4	32.1
Output: Better than ERS (%)	4560.0%	4980.0%	4560.0%	5000.0%	5090.0%	4980.0%	4990.0%	5160.0%	4590.0%	5110.0%
Output: Better than Envelope (%)	5730.0%	4360.0%	5730.0%	4480.0%	4360.0%	4360.0%	4410.0%	4360.0%	5800.0%	4480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	468	3001	468	2951	3002	3001	2978	3002	470	2952
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 65.96	$ 423.11	$ 65.96	$ 416.03	$ 423.23	$ 423.11	$ 419.87	$ 423.31	$ 66.2	$ 416.16
Annual savings in carbon tax for electricity [$/year]	$ .23	$ 1.5	$ .23	$ 1.48	$ 1.5	$ 1.5	$ 1.49	$ 1.5	$ .23	$ 1.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 66.19	$ 424.61	$ 66.19	$ 417.51	$ 424.73	$ 424.61	$ 421.36	$ 424.81	$ 66.43	$ 417.64
Annual savings in GHG from electricity savings [kg CO2e/year]	5.1	33	5.1	32.5	33	33	32.8	33	5.2	32.5
Annual savings in natural gas [m3/year]	70.3	87.57	70.3	87.57	88.77	87.57	87.57	89.55	70.63	88.77
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 651.33	$ 811.3	$ 651.33	$ 811.3	$ 822.45	$ 811.3	$ 811.3	$ 829.7	$ 654.4	$ 822.45
Annual savings in carbon tax for natural gas [$/year]	$ 162.57	$ 202.5	$ 162.57	$ 202.5	$ 205.28	$ 202.5	$ 202.5	$ 207.09	$ 163.34	$ 205.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 813.9	$ 1,013.79	$ 813.9	$ 1,013.79	$ 1,027.73	$ 1,013.79	$ 1,013.79	$ 1,036.79	$ 817.74	$ 1,027.73
Annual savings in GHG from natural gas savings [kg CO2e/year]	3612.6	4499.9	3612.6	4499.9	4561.8	4499.9	4499.9	4602	3629.7	4561.8
Net Present Value [$]	$ 7,069.56	$ 7,303.55	$ 7,365.84	$ 7,489.21	$ 7,585.19	$ 7,599.83	$ 7,664.97	$ 7,710.74	$ 7,733.07	$ 7,771.04
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	10.51	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 1,566.12	$ 8,365.27	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 8,365.27	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 1,286.55	$ 229.23	$ 1,286.55	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	NBC gas furnace	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 850.	$.	$ 550.	$.	$.	$ 850.	$ 850.	$ 550.

MEDIUM 018WWR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,500.59	$ 6,721.33	$ 6,815.52	$ 7,036.26	$ 7,050.59	$ 7,100.59	$ 7,136.26	$ 7,150.59	$ 7,252.15	$ 7,271.33
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,763.89	$ 10,095.44	$ 10,236.91	$ 10,568.46	$ 10,589.99	$ 10,665.09	$ 10,718.66	$ 10,740.19	$ 10,892.73	$ 10,921.54
Net Present Value [$]	$ 6,135.53	$ 6,071.63	$ 5,992.49	$ 5,927.62	$ 5,966.73	$ 7,666.52	$ 6,314.74	$ 6,295.5	$ 6,455.26	$ 5,902.83
Incremental dollars per GHG saving	$ 2.61	$ 2.66	$ 2.7	$ 2.75	$ 2.74	$ 2.38	$ 2.65	$ 2.65	$ 2.64	$ 2.79
Auxiliary Energy Required Heating [GJ/yr]	56.4	55.8	55.7	55.1	56.4	57.5	62.9	64.2	61.8	55.8
Annual Energy DHW [GJ/yr]	26.5	26.5	26.5	26.5	24.8	15.8	15.8	14.3	15.8	24.8
Annual Energy Space Heating [GJ/yr]	59.7	59.1	59	58.3	59.7	61	66.6	68	65.5	59.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	112.7	112	111.9	111.3	111	103.1	108.8	108.7	107.7	110.3
Design Heating Load [W]	11755.6	11648.8	11680.4	11573.6	11755.6	11352.6	12427.1	12609	11352.6	11648.8
Annual Energy Electricity [kWh/yr]	7628.4	7625.1	7624.8	7621.5	7628.4	7634.5	7662.6	7669.7	7657.1	7625.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,016.1	$ 1,015.64	$ 1,015.59	$ 1,015.13	$ 1,016.1	$ 1,016.97	$ 1,020.94	$ 1,021.95	$ 1,020.16	$ 1,015.64
Annual Energy Natural Gas [m3/yr]	2287.7	2270	2268.3	2250.7	2242.2	2031.4	2179.9	2178.3	2151	2224.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 986.83	$ 979.2	$ 978.47	$ 970.87	$ 967.21	$ 876.28	$ 940.33	$ 939.64	$ 927.87	$ 959.57
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	13069	13339	11450	11452	3622	1733	11398	11720
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg1131102031	Pkg1121101031	Pkg2121101021	Pkg2121102031
GHGI [kg/m2]	19.05	18.9	18.89	18.74	18.67	16.95	18.17	18.15	17.93	18.53
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	66.8	66.1	66	65.3	66.8	68.2	74.5	76.1	73.3	66.1
Output: MEUI [kWh/(m2 * yr)]	103.1	102.3	102.3	101.5	101.1	91.9	98.5	98.5	97.2	100.3
Output: Better than ERS (%)	2120.0%	2170.0%	2170.0%	2220.0%	2240.0%	2450.0%	2030.0%	2040.0%	2110.0%	2290.0%
Output: Better than Envelope (%)	1730.0%	1820.0%	1830.0%	1920.0%	1730.0%	1570.0%	780.0%	590.0%	940.0%	1820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	691	695	695	698	691	685	657	650	663	695
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 97.47	$ 97.94	$ 97.98	$ 98.45	$ 97.47	$ 96.61	$ 92.65	$ 91.65	$ 93.43	$ 97.94
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .34	$ .33	$ .32	$ .33	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 97.82	$ 98.29	$ 98.33	$ 98.8	$ 97.82	$ 96.96	$ 92.98	$ 91.98	$ 93.76	$ 98.29
Annual savings in GHG from electricity savings [kg CO2e/year]	7.6	7.6	7.6	7.7	7.6	7.5	7.2	7.2	7.3	7.6
Annual savings in natural gas [m3/year]	48.29	48.95	49.01	49.67	49.99	57.84	52.31	52.37	53.38	50.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 447.42	$ 453.53	$ 454.12	$ 460.19	$ 463.13	$ 535.89	$ 484.63	$ 485.18	$ 494.61	$ 469.24
Annual savings in carbon tax for natural gas [$/year]	$ 111.67	$ 113.2	$ 113.35	$ 114.86	$ 115.59	$ 133.76	$ 120.96	$ 121.1	$ 123.45	$ 117.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 559.09	$ 566.73	$ 567.46	$ 575.05	$ 578.72	$ 669.65	$ 605.59	$ 606.28	$ 618.06	$ 586.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	2481.6	2515.5	2518.8	2552.5	2568.8	2972.4	2688	2691.1	2743.4	2602.6
Net Present Value [$]	$ 6,135.53	$ 6,071.63	$ 5,992.49	$ 5,927.62	$ 5,966.73	$ 7,666.52	$ 6,314.74	$ 6,295.5	$ 6,455.26	$ 5,902.83
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 550.

MEDIUM 018WWR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,684.47	$ 8,905.21	$ 8,084.47	$ 8,999.4	$ 9,234.47	$ 8,305.21	$ 9,220.14	$ 8,399.4	$ 10,524.59	$ 9,455.21
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,044.07	$ 13,375.63	$ 12,142.87	$ 13,517.1	$ 13,870.17	$ 12,474.43	$ 13,848.65	$ 12,615.9	$ 15,807.93	$ 14,201.73
Net Present Value [$]	$ 5,428.07	$ 5,441.39	$ 7,106.35	$ 5,502.17	$ 5,657.18	$ 7,118.57	$ 5,531.38	$ 7,163.54	$ 10,401.62	$ 5,670.32
Incremental dollars per GHG saving	$ 1.46	$ 1.5	$ 1.5	$ 1.51	$ 1.53	$ 1.54	$ 1.55	$ 1.56	$ 1.56	$ 1.57
Auxiliary Energy Required Heating [GJ/yr]	71.6	70.9	70.1	70.8	71.6	69.5	70.2	69.4	69.5	70.9
Annual Energy DHW [GJ/yr]	15.8	15.8	26.6	15.8	14.3	26.6	15.8	26.5	9.1	14.3
Annual Energy Space Heating [GJ/yr]	35.4	35.1	35.1	35	35.4	34.8	34.8	34.7	35.3	35.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	78.2	77.9	88.8	77.9	76.8	88.5	77.6	88.4	71.8	76.5
Design Heating Load [W]	12335.4	12228.6	12739.8	12260.1	12335.4	12633	12153.4	12664.5	13116.8	12228.6
Annual Energy Electricity [kWh/yr]	17335.9	17255.3	17280.2	17242.3	17337.4	17198.9	17167.9	17181.4	19932.2	17256.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,389.71	$ 2,378.31	$ 2,381.83	$ 2,376.47	$ 2,389.93	$ 2,370.33	$ 2,365.94	$ 2,367.85	$ 2,757.09	$ 2,378.52
Annual Energy Natural Gas [m3/yr]	423.9	423.9	713	423.9	385.1	713.1	423.9	712.6	0	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 307.56	$ 182.86	$ 166.12	$ 307.61	$ 182.86	$ 307.39	$.	$ 166.12
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11353	11623	11350	12973	11354	11620	13243	12970	1744	11624
Upgrade Package List	Pkg2121101011	Pkg2121102011	Pkg2121101011	Pkg2131101011	Pkg2121101011	Pkg2121102011	Pkg2131102011	Pkg2131101011	Pkg1121101031	Pkg2121102011
GHGI [kg/m2]	4.28	4.27	6.64	4.27	3.96	6.63	4.27	6.63	0.94	3.96
% ICC	1.7%	1.7%	1.5%	1.7%	1.8%	1.6%	1.8%	1.6%	2.0%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	84.8	84	83.1	83.9	84.8	82.3	83.2	82.3	82.4	84
Output: MEUI [kWh/(m2 * yr)]	62.2	61.9	74.7	61.8	60.5	74.4	61.5	74.3	54.5	60.2
Output: Better than ERS (%)	4140.0%	4160.0%	3660.0%	4160.0%	4240.0%	3680.0%	4180.0%	3690.0%	4660.0%	4270.0%
Output: Better than Envelope (%)	500.0%	400.0%	280.0%	380.0%	500.0%	190.0%	290.0%	180.0%	190.0%	400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9016	8936	8960	8923	9018	8879	8848	8862	11612	8937
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,271.28	$ 1,259.92	$ 1,263.43	$ 1,258.09	$ 1,271.5	$ 1,251.97	$ 1,247.6	$ 1,249.5	$ 1,637.36	$ 1,260.13
Annual savings in carbon tax for electricity [$/year]	$ 4.51	$ 4.47	$ 4.48	$ 4.46	$ 4.51	$ 4.44	$ 4.42	$ 4.43	$ 5.81	$ 4.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,275.79	$ 1,264.39	$ 1,267.91	$ 1,262.55	$ 1,276.	$ 1,256.41	$ 1,252.02	$ 1,253.93	$ 1,643.17	$ 1,264.6
Annual savings in GHG from electricity savings [kg CO2e/year]	99.2	98.3	98.6	98.1	99.2	97.7	97.3	97.5	127.7	98.3
Annual savings in natural gas [m3/year]	117.73	117.73	106.96	117.73	119.18	106.96	117.73	106.98	133.53	119.18
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,090.81	$ 1,090.81	$ 991.01	$ 1,090.81	$ 1,104.2	$ 990.98	$ 1,090.81	$ 991.15	$ 1,237.14	$ 1,104.2
Annual savings in carbon tax for natural gas [$/year]	$ 272.26	$ 272.26	$ 247.35	$ 272.26	$ 275.6	$ 247.34	$ 272.26	$ 247.39	$ 308.78	$ 275.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,363.07	$ 1,363.07	$ 1,238.36	$ 1,363.07	$ 1,379.81	$ 1,238.32	$ 1,363.07	$ 1,238.54	$ 1,545.93	$ 1,379.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	6050.2	6050.2	5496.7	6050.2	6124.5	5496.5	6050.2	5497.5	6861.9	6124.5
Net Present Value [$]	$ 5,428.07	$ 5,441.39	$ 7,106.35	$ 5,502.17	$ 5,657.18	$ 7,118.57	$ 5,531.38	$ 7,163.54	$ 10,401.62	$ 5,670.32
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,566.12	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.	$.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$ 550.

MEDIUM 018WWR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,100.59	$ 7,321.33	$ 7,415.52	$ 7,636.26	$ 7,650.59	$ 8,563.63	$ 7,871.33	$ 7,950.59	$ 8,784.37	$ 7,965.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,665.09	$ 10,996.64	$ 11,138.11	$ 11,469.66	$ 11,491.19	$ 12,862.57	$ 11,822.74	$ 11,941.79	$ 13,194.12	$ 11,964.21
Net Present Value [$]	$ 7,666.52	$ 7,603.77	$ 7,521.05	$ 7,458.06	$ 7,438.81	$ 7,406.56	$ 7,376.07	$ 7,352.59	$ 7,342.47	$ 7,293.34
Incremental dollars per GHG saving	$ 2.38	$ 2.43	$ 2.46	$ 2.5	$ 2.51	$ 2.64	$ 2.55	$ 2.56	$ 2.68	$ 2.58
Auxiliary Energy Required Heating [GJ/yr]	57.5	56.9	56.9	56.2	57.6	52.7	56.9	57.6	52.1	56.9
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	15.8	14.3	13.4	15.8	14.3
Annual Energy Space Heating [GJ/yr]	61	60.3	60.2	59.6	61	55.8	60.3	61	55.1	60.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	103.1	102.5	102.4	101.7	101.7	98	101	100.8	97.3	101
Design Heating Load [W]	11352.6	11245.8	11277.4	11170.6	11352.6	10772.6	11245.8	11352.6	10665.8	11277.4
Annual Energy Electricity [kWh/yr]	7634.5	7631.1	7630.9	7627.5	7634.6	7608.8	7631.2	7634.6	7605.5	7631
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,016.97	$ 1,016.49	$ 1,016.46	$ 1,015.98	$ 1,016.98	$ 1,013.33	$ 1,016.5	$ 1,016.98	$ 1,012.86	$ 1,016.47
Annual Energy Natural Gas [m3/yr]	2031.4	2013.6	2012.3	1994.5	1992.9	1895.7	1975.1	1967.4	1878	1973.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 876.28	$ 868.6	$ 868.04	$ 860.36	$ 859.67	$ 817.74	$ 851.99	$ 848.67	$ 810.1	$ 851.43
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	13342	11453	17824	11723	11454	18094	13073
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2121101031	Pkg2221102031	Pkg2131101031
GHGI [kg/m2]	16.95	16.81	16.8	16.65	16.64	15.84	16.49	16.43	15.7	16.48
% ICC	1.4%	1.4%	1.4%	1.5%	1.5%	1.6%	1.5%	1.5%	1.7%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	68.2	67.4	67.4	66.6	68.2	62.4	67.5	68.2	61.7	67.4
Output: MEUI [kWh/(m2 * yr)]	91.9	91.1	91	90.2	90.2	85.8	89.4	89	85	89.3
Output: Better than ERS (%)	2450.0%	2490.0%	2500.0%	2550.0%	2550.0%	2820.0%	2600.0%	2620.0%	2870.0%	2600.0%
Output: Better than Envelope (%)	1570.0%	1660.0%	1660.0%	1760.0%	1550.0%	2270.0%	1660.0%	1550.0%	2360.0%	1660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	685	689	689	692	685	711	688	685	714	689
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 96.61	$ 97.09	$ 97.12	$ 97.6	$ 96.6	$ 100.24	$ 97.08	$ 96.6	$ 100.7	$ 97.11
Annual savings in carbon tax for electricity [$/year]	$ .34	$ .34	$ .34	$ .35	$ .34	$ .36	$ .34	$ .34	$ .36	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 96.96	$ 97.44	$ 97.47	$ 97.95	$ 96.94	$ 100.59	$ 97.42	$ 96.94	$ 101.06	$ 97.45
Annual savings in GHG from electricity savings [kg CO2e/year]	7.5	7.6	7.6	7.6	7.5	7.8	7.6	7.5	7.9	7.6
Annual savings in natural gas [m3/year]	57.84	58.5	58.55	59.22	59.28	62.9	59.94	60.23	63.56	59.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 535.89	$ 542.04	$ 542.49	$ 548.63	$ 549.18	$ 582.74	$ 555.33	$ 557.99	$ 588.85	$ 555.78
Annual savings in carbon tax for natural gas [$/year]	$ 133.76	$ 135.29	$ 135.4	$ 136.94	$ 137.07	$ 145.45	$ 138.61	$ 139.27	$ 146.97	$ 138.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 669.65	$ 677.33	$ 677.89	$ 685.57	$ 686.26	$ 728.19	$ 693.94	$ 697.26	$ 735.82	$ 694.5
Annual savings in GHG from natural gas savings [kg CO2e/year]	2972.4	3006.5	3008.9	3043	3046.1	3232.2	3080.2	3094.9	3266.1	3082.7
Net Present Value [$]	$ 7,666.52	$ 7,603.77	$ 7,521.05	$ 7,458.06	$ 7,438.81	$ 7,406.56	$ 7,376.07	$ 7,352.59	$ 7,342.47	$ 7,293.34
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 018WWR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 11,010.59	$ 11,113.63	$ 11,231.33	$ 11,325.52	$ 11,334.37	$ 11,428.56	$ 11,450.59	$ 11,546.26	$ 11,560.59	$ 11,649.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,537.91	$ 16,692.67	$ 16,869.46	$ 17,010.93	$ 17,024.22	$ 17,165.7	$ 17,198.79	$ 17,342.48	$ 17,364.01	$ 17,497.25
Net Present Value [$]	$ 6,243.09	$ 4,596.79	$ 6,298.47	$ 6,346.54	$ 4,650.88	$ 4,704.98	$ 6,004.3	$ 6,374.65	$ 6,412.14	$ 4,751.35
Incremental dollars per GHG saving	$ 2.03	$ 2.05	$ 2.07	$ 2.09	$ 2.09	$ 2.11	$ 2.11	$ 2.13	$ 2.1	$ 2.15
Auxiliary Energy Required Heating [GJ/yr]	54.5	51.4	53.9	53.8	50.8	50.8	52.4	53.2	54.5	50.2
Annual Energy DHW [GJ/yr]	26.6	26.6	26.6	26.5	26.6	26.5	26.6	26.5	24.9	26.5
Annual Energy Space Heating [GJ/yr]	28.3	26.8	28.1	28	26.6	26.6	27.4	27.8	28.3	26.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	0.8	1.7	1.7	0.8	0.8	1.7	1.7	1.7	0.8
Total Energy [GJ/yr]	83.5	81	83.2	83.2	80.8	80.7	82.5	82.9	81.8	80.5
Design Heating Load [W]	11026.4	11270.4	10919.6	10951.2	11163.6	11195.2	10816.6	10844.4	11026.4	11088.4
Annual Energy Electricity [kWh/yr]	15808	15128.5	15743.4	15727.1	15063.4	15049.4	15543.7	15652	15808	14981.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,173.52	$ 2,077.37	$ 2,164.38	$ 2,162.07	$ 2,068.16	$ 2,066.18	$ 2,136.12	$ 2,151.44	$ 2,173.52	$ 2,056.6
Annual Energy Natural Gas [m3/yr]	713.1	713.1	713.2	712.7	713.2	712.7	713.3	712.8	667.6	712.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.61	$ 307.61	$ 307.65	$ 307.43	$ 307.65	$ 307.43	$ 307.69	$ 307.48	$ 287.98	$ 307.43
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11476	17830	11746	13096	18100	20962	11494	13366	11477	21232
Upgrade Package List	Pkg2121101032	Pkg2221101031	Pkg2121102032	Pkg2131101032	Pkg2221102031	Pkg2231101031	Pkg2121101033	Pkg2131102032	Pkg2121101032	Pkg2231102031
GHGI [kg/m2]	6.57	6.53	6.56	6.56	6.53	6.53	6.56	6.56	6.2	6.52
% ICC	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.6	61	63.8	63.8	60.2	60.2	62.1	63	64.6	59.4
Output: MEUI [kWh/(m2 * yr)]	68.4	65.5	68.1	68	65.2	65.1	67.3	67.7	66.4	64.8
Output: Better than ERS (%)	4040.0%	4210.0%	4060.0%	4060.0%	4230.0%	4240.0%	4110.0%	4080.0%	4160.0%	4250.0%
Output: Better than Envelope (%)	2010.0%	2460.0%	2100.0%	2110.0%	2550.0%	2550.0%	2320.0%	2200.0%	2010.0%	2640.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7488	6809	7424	7407	6744	6730	7224	7332	7488	6662
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,055.85	$ 960.04	$ 1,046.74	$ 1,044.44	$ 950.86	$ 948.89	$ 1,018.58	$ 1,033.85	$ 1,055.85	$ 939.34
Annual savings in carbon tax for electricity [$/year]	$ 3.74	$ 3.4	$ 3.71	$ 3.7	$ 3.37	$ 3.36	$ 3.61	$ 3.67	$ 3.74	$ 3.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,059.59	$ 963.45	$ 1,050.45	$ 1,048.15	$ 954.23	$ 952.25	$ 1,022.2	$ 1,037.52	$ 1,059.59	$ 942.67
Annual savings in GHG from electricity savings [kg CO2e/year]	82.4	74.9	81.7	81.5	74.2	74	79.5	80.7	82.4	73.3
Annual savings in natural gas [m3/year]	106.96	106.96	106.96	106.97	106.96	106.97	106.95	106.97	108.65	106.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 990.98	$ 990.98	$ 990.94	$ 991.11	$ 990.94	$ 991.11	$ 990.91	$ 991.08	$ 1,006.68	$ 991.11
Annual savings in carbon tax for natural gas [$/year]	$ 247.34	$ 247.34	$ 247.33	$ 247.38	$ 247.33	$ 247.38	$ 247.33	$ 247.37	$ 251.26	$ 247.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,238.32	$ 1,238.32	$ 1,238.28	$ 1,238.49	$ 1,238.28	$ 1,238.49	$ 1,238.23	$ 1,238.45	$ 1,257.95	$ 1,238.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	5496.5	5496.5	5496.3	5497.3	5496.3	5497.3	5496.1	5497.1	5583.6	5497.3
Net Present Value [$]	$ 6,243.09	$ 4,596.79	$ 6,298.47	$ 6,346.54	$ 4,650.88	$ 4,704.98	$ 6,004.3	$ 6,374.65	$ 6,412.14	$ 4,751.35
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	3.87	3.87	5.28	5.28	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	NA	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$.	$ 1,360.	$ 1,360.	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 11,713.63	$ 11,934.37	$ 12,028.56	$ 12,050.59	$ 12,263.63	$ 11,010.59	$ 12,146.26	$ 12,249.3	$ 11,113.63	$ 12,271.33
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,593.87	$ 17,925.42	$ 18,066.9	$ 18,099.99	$ 18,419.97	$ 16,537.91	$ 18,243.68	$ 18,398.45	$ 16,692.67	$ 18,431.54
Net Present Value [$]	$ 2,896.97	$ 2,932.57	$ 3,004.66	$ 4,303.14	$ 3,125.53	$ 6,243.09	$ 4,663.2	$ 3,039.9	$ 4,596.79	$ 4,336.19
Incremental dollars per GHG saving	$ 1.96	$ 2.	$ 2.01	$ 2.02	$ 2.03	$ 2.03	$ 2.04	$ 2.05	$ 2.05	$ 2.06
Auxiliary Energy Required Heating [GJ/yr]	52.5	51.9	51.9	53.5	52.5	54.5	54.3	51.2	51.4	52.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	26.6	15.8	15.8	26.6	15.8
Annual Energy Space Heating [GJ/yr]	27	26.8	26.7	27.6	27	28.3	27.9	26.5	26.8	27.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	1.7	0.8	1.7	1.7	0.8	0.8	1.7
Total Energy [GJ/yr]	70.4	70.2	70.1	71.9	69	83.5	72.3	69.9	81	71.7
Design Heating Load [W]	10866	10759.2	10790.8	10412.2	10866	11026.4	10440	10684	11270.4	10305.4
Annual Energy Electricity [kWh/yr]	15176.1	15104.2	15095.6	15591.4	15177.4	15808	15694.1	15023.5	15128.5	15518.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,084.1	$ 2,073.93	$ 2,072.71	$ 2,142.87	$ 2,084.29	$ 2,173.52	$ 2,157.4	$ 2,062.51	$ 2,077.37	$ 2,132.55
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	713.1	423.9	423.9	713.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 307.61	$ 182.86	$ 182.86	$ 307.61	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	18103	20965	11497	17834	11476	13369	21235	17830	11767
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2121101033	Pkg2221101031	Pkg2121101032	Pkg2133102032	Pkg2231102031	Pkg2221101031	Pkg2121102033
GHGI [kg/m2]	4.17	4.17	4.17	4.19	3.86	6.57	4.2	4.17	6.53	4.19
% ICC	2.2%	2.3%	2.3%	2.3%	2.3%	2.1%	2.3%	2.3%	2.1%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	62.2	61.5	61.5	63.4	62.3	64.6	64.3	60.7	61	62.6
Output: MEUI [kWh/(m2 * yr)]	52.9	52.6	52.6	54.7	51.2	68.4	55.1	52.3	65.5	54.4
Output: Better than ERS (%)	4720.0%	4740.0%	4750.0%	4610.0%	4830.0%	4040.0%	4580.0%	4760.0%	4210.0%	4630.0%
Output: Better than Envelope (%)	2300.0%	2390.0%	2390.0%	2160.0%	2300.0%	2010.0%	2040.0%	2490.0%	2460.0%	2260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6856	6784	6776	7272	6858	7488	7374	6704	6809	7199
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 966.75	$ 956.61	$ 955.4	$ 1,025.31	$ 966.94	$ 1,055.85	$ 1,039.79	$ 945.24	$ 960.04	$ 1,015.03
Annual savings in carbon tax for electricity [$/year]	$ 3.43	$ 3.39	$ 3.39	$ 3.64	$ 3.43	$ 3.74	$ 3.69	$ 3.35	$ 3.4	$ 3.6
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 970.18	$ 960.01	$ 958.79	$ 1,028.95	$ 970.36	$ 1,059.59	$ 1,043.48	$ 948.59	$ 963.45	$ 1,018.63
Annual savings in GHG from electricity savings [kg CO2e/year]	75.4	74.6	74.5	80	75.4	82.4	81.1	73.7	74.9	79.2
Annual savings in natural gas [m3/year]	117.73	117.73	117.73	117.73	119.18	106.96	117.73	117.73	106.96	117.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,090.81	$ 1,090.81	$ 1,090.81	$ 1,090.81	$ 1,104.2	$ 990.98	$ 1,090.81	$ 1,090.81	$ 990.98	$ 1,090.81
Annual savings in carbon tax for natural gas [$/year]	$ 272.26	$ 272.26	$ 272.26	$ 272.26	$ 275.6	$ 247.34	$ 272.26	$ 272.26	$ 247.34	$ 272.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,363.07	$ 1,363.07	$ 1,363.07	$ 1,363.07	$ 1,379.81	$ 1,238.32	$ 1,363.07	$ 1,363.07	$ 1,238.32	$ 1,363.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	6050.2	6050.2	6050.2	6050.2	6124.5	5496.5	6050.2	6050.2	5496.5	6050.2
Net Present Value [$]	$ 2,896.97	$ 2,932.57	$ 3,004.66	$ 4,303.14	$ 3,125.53	$ 6,243.09	$ 4,663.2	$ 3,039.9	$ 4,596.79	$ 4,336.19
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	3.87	3.87	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	NA	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$.	$ 1,360.	$ 1,360.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

MEDIUM 018WWR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,566.44	$ 14,645.7	$ 14,681.37	$ 14,866.44	$ 14,660.63	$ 14,881.37	$ 14,960.63	$ 15,181.37	$ 15,003.19	$ 14,968.12
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,878.79	$ 21,997.84	$ 22,051.42	$ 22,329.39	$ 22,020.27	$ 22,351.82	$ 22,470.87	$ 22,802.42	$ 22,534.79	$ 22,482.12
Net Present Value [$]	$ 4,050.19	$ 4,030.29	$ 4,022.96	$ 3,963.96	$ 3,959.58	$ 3,892.28	$ 3,873.11	$ 3,805.69	$ 3,742.88	$ 3,683.27
Incremental dollars per GHG saving	$ 3.68	$ 3.69	$ 3.69	$ 3.71	$ 3.7	$ 3.73	$ 3.73	$ 3.76	$ 3.76	$ 3.78
Auxiliary Energy Required Heating [GJ/yr]	40.6	41.2	41.1	40.6	40.6	40	40.6	40	40.9	39.1
Annual Energy DHW [GJ/yr]	14.3	13.4	13.4	13.4	14.3	14.3	13.4	13.4	13.4	15.8
Annual Energy Space Heating [GJ/yr]	43	43.7	43.6	43	43	42.3	43	42.3	43.4	41.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	84.7	84.3	84.3	83.7	84.7	84	83.7	83.1	84.1	84.6
Design Heating Load [W]	8563.2	8670	8533	8563.2	8594.8	8488	8594.8	8488	8545.3	8425.2
Annual Energy Electricity [kWh/yr]	7806.1	7809.4	7808.8	7806.1	7806	7802.7	7806	7802.8	7807.9	7798.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,041.25	$ 1,041.72	$ 1,041.63	$ 1,041.25	$ 1,041.23	$ 1,040.77	$ 1,041.23	$ 1,040.78	$ 1,041.5	$ 1,040.16
Annual Energy Natural Gas [m3/yr]	1519.1	1511	1507.8	1493.6	1518.7	1501.4	1493.2	1475.9	1503.1	1517.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 655.29	$ 651.79	$ 650.41	$ 644.29	$ 655.11	$ 647.65	$ 644.11	$ 636.65	$ 648.38	$ 654.51
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43673	43458	45600	43674	45401	45617	45402	45618	43872	45832
Upgrade Package List	Pkg3321202034	Pkg3321201034	Pkg3331202033	Pkg3321202034	Pkg3331201034	Pkg3331202034	Pkg3331201034	Pkg3331202034	Pkg3321203033	Pkg3331203034
GHGI [kg/m2]	12.78	12.71	12.68	12.57	12.77	12.63	12.56	12.42	12.64	12.76
% ICC	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	48.1	48.9	48.7	48.1	48.1	47.4	48.1	47.4	48.5	46.4
Output: MEUI [kWh/(m2 * yr)]	70	69.6	69.5	68.9	70	69.2	68.8	68.1	69.3	69.9
Output: Better than ERS (%)	3790.0%	3820.0%	3820.0%	3870.0%	3790.0%	3850.0%	3870.0%	3910.0%	3840.0%	3800.0%
Output: Better than Envelope (%)	4050.0%	3960.0%	3970.0%	4050.0%	4050.0%	4130.0%	4050.0%	4130.0%	4000.0%	4270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	514	510	511	514	514	517	514	517	512	521
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 72.42	$ 71.95	$ 72.04	$ 72.42	$ 72.43	$ 72.9	$ 72.43	$ 72.88	$ 72.16	$ 73.5
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 72.67	$ 72.21	$ 72.29	$ 72.67	$ 72.69	$ 73.16	$ 72.69	$ 73.14	$ 72.42	$ 73.76
Annual savings in GHG from electricity savings [kg CO2e/year]	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.6	5.7
Annual savings in natural gas [m3/year]	76.93	77.23	77.35	77.88	76.94	77.59	77.89	78.54	77.52	77
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 712.74	$ 715.54	$ 716.64	$ 721.55	$ 712.88	$ 718.85	$ 721.68	$ 727.66	$ 718.27	$ 713.36
Annual savings in carbon tax for natural gas [$/year]	$ 177.9	$ 178.6	$ 178.87	$ 180.09	$ 177.93	$ 179.42	$ 180.13	$ 181.62	$ 179.28	$ 178.05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 890.64	$ 894.13	$ 895.51	$ 901.64	$ 890.81	$ 898.27	$ 901.81	$ 909.27	$ 897.54	$ 891.42
Annual savings in GHG from natural gas savings [kg CO2e/year]	3953.3	3968.8	3974.9	4002.1	3954	3987.2	4002.9	4036	3983.9	3956.7
Net Present Value [$]	$ 4,050.19	$ 4,030.29	$ 4,022.96	$ 3,963.96	$ 3,959.58	$ 3,892.28	$ 3,873.11	$ 3,805.69	$ 3,742.88	$ 3,683.27
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	8.78	10.51	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$ 850.	$.

MEDIUM 018WWR Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85
Total increase in construction cost [$]	$ 16,881.37	$ 17,203.19	$ 17,342.25	$ 17,403.02	$ 17,431.37	$ 17,518.12	$ 17,527.32	$ 17,623.76	$ 17,638.53	$ 17,664.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,355.82	$ 25,839.19	$ 26,048.06	$ 26,139.34	$ 26,181.92	$ 26,312.22	$ 26,326.03	$ 26,470.89	$ 26,493.07	$ 26,531.43
Net Present Value [$]	$ 6,828.2	$ 7,126.09	$ 7,289.08	$ 7,385.35	$ 6,997.01	$ 7,242.75	$ 6,965.53	$ 7,431.05	$ 7,585.36	$ 7,586.97
Incremental dollars per GHG saving	$ 3.11	$ 3.17	$ 3.19	$ 3.2	$ 3.16	$ 3.22	$ 3.22	$ 3.24	$ 3.25	$ 3.25
Auxiliary Energy Required Heating [GJ/yr]	38.8	38.6	38.8	39	38.8	38	37.8	38.4	38.8	38.6
Annual Energy DHW [GJ/yr]	26.6	26.6	26.6	26.6	24.9	26.6	26.6	26.6	26.6	26.6
Annual Energy Space Heating [GJ/yr]	20.9	20.9	20.9	21	20.9	20.6	20.2	20.7	20.9	20.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	76.1	76.1	76.1	76.1	74.4	75.8	75.4	75.9	76.1	76.1
Design Heating Load [W]	8966.2	8978.6	8966.2	9020.7	8966.2	8903.4	8545.3	8913.9	8966.2	8978.6
Annual Energy Electricity [kWh/yr]	13752.9	13741.6	13752.9	13768	13752.9	13666.3	13554.7	13699.6	13752.9	13741.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,882.72	$ 1,881.12	$ 1,882.72	$ 1,884.86	$ 1,882.72	$ 1,870.47	$ 1,854.68	$ 1,875.18	$ 1,882.72	$ 1,881.12
Annual Energy Natural Gas [m3/yr]	713.7	714.3	713.7	713.3	668.2	713.8	713.9	713.4	713.7	714.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.87	$ 308.12	$ 307.87	$ 307.69	$ 288.24	$ 307.91	$ 307.95	$ 307.74	$ 307.87	$ 308.12
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45622	43894	46270	47350	45623	45838	50986	47566	46918	44542
Upgrade Package List	Pkg3331202034	Pkg3321203034	Pkg3331302034	Pkg3341201034	Pkg3331202034	Pkg3331203034	Pkg4321302033	Pkg3341202034	Pkg3331402034	Pkg3321303034
GHGI [kg/m2]	6.48	6.48	6.48	6.47	6.1	6.47	6.47	6.47	6.48	6.48
% ICC	3.2%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	46	45.8	46	46.2	46	45	44.9	45.5	46	45.8
Output: MEUI [kWh/(m2 * yr)]	59.6	59.6	59.6	59.7	57.6	59.3	58.8	59.4	59.6	59.6
Output: Better than ERS (%)	4560.0%	4560.0%	4560.0%	4560.0%	4690.0%	4590.0%	4610.0%	4580.0%	4560.0%	4560.0%
Output: Better than Envelope (%)	4310.0%	4340.0%	4310.0%	4280.0%	4310.0%	4430.0%	4460.0%	4370.0%	4310.0%	4340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5433	5422	5433	5448	5433	5347	5235	5380	5433	5422
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 766.08	$ 764.49	$ 766.08	$ 768.21	$ 766.08	$ 753.87	$ 738.13	$ 758.57	$ 766.08	$ 764.49
Annual savings in carbon tax for electricity [$/year]	$ 2.72	$ 2.71	$ 2.72	$ 2.72	$ 2.72	$ 2.67	$ 2.62	$ 2.69	$ 2.72	$ 2.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 768.8	$ 767.2	$ 768.8	$ 770.93	$ 768.8	$ 756.54	$ 740.75	$ 761.26	$ 768.8	$ 767.2
Annual savings in GHG from electricity savings [kg CO2e/year]	59.8	59.6	59.8	59.9	59.8	58.8	57.6	59.2	59.8	59.6
Annual savings in natural gas [m3/year]	106.94	106.91	106.94	106.95	108.63	106.93	106.93	106.95	106.94	106.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 990.77	$ 990.56	$ 990.77	$ 990.91	$ 1,006.48	$ 990.74	$ 990.7	$ 990.87	$ 990.77	$ 990.56
Annual savings in carbon tax for natural gas [$/year]	$ 247.29	$ 247.24	$ 247.29	$ 247.33	$ 251.21	$ 247.28	$ 247.27	$ 247.32	$ 247.29	$ 247.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,238.06	$ 1,237.8	$ 1,238.06	$ 1,238.23	$ 1,257.69	$ 1,238.02	$ 1,237.97	$ 1,238.19	$ 1,238.06	$ 1,237.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	5495.4	5494.2	5495.4	5496.1	5582.5	5495.2	5495	5495.9	5495.4	5494.2
Net Present Value [$]	$ 6,828.2	$ 7,126.09	$ 7,289.08	$ 7,385.35	$ 6,997.01	$ 7,242.75	$ 6,965.53	$ 7,431.05	$ 7,585.36	$ 7,586.97
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	8.78	10.51	14.09	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 1,163.13	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 1,286.55	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 2,213.87	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

MEDIUM 018WWR Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,118.12	$ 18,442.25	$ 18,668.12	$ 18,579.	$ 18,968.12	$ 16,881.37	$ 18,627.32	$ 18,738.53	$ 18,992.25	$ 18,764.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,213.42	$ 27,700.26	$ 28,039.52	$ 27,905.66	$ 28,490.12	$ 25,355.82	$ 27,978.23	$ 28,145.27	$ 28,526.36	$ 28,183.63
Net Present Value [$]	$ 5,514.83	$ 5,437.82	$ 5,743.21	$ 5,975.71	$ 5,830.11	$ 6,828.2	$ 5,514.8	$ 5,734.1	$ 5,666.57	$ 5,734.08
Incremental dollars per GHG saving	$ 3.02	$ 3.08	$ 3.08	$ 3.1	$ 3.1	$ 3.11	$ 3.11	$ 3.13	$ 3.13	$ 3.13
Auxiliary Energy Required Heating [GJ/yr]	39	38.5	39	39	39	38.8	37.9	38.5	38.5	38.3
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	15.8	13.4	26.6	15.8	15.8	14.3	15.8
Annual Energy Space Heating [GJ/yr]	20.8	20.2	20.8	20.8	20.8	20.9	20.1	20.2	20.2	20.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	65.1	64.6	63.7	65.1	62.7	76.1	64.4	64.6	63.1	64.5
Design Heating Load [W]	8514.6	8120.8	8514.6	8514.6	8514.6	8966.2	8151	8120.8	8120.8	8133.2
Annual Energy Electricity [kWh/yr]	13705.2	13549.4	13706.5	13705.2	13707.4	13752.9	13507.4	13549.4	13550.8	13539.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,875.97	$ 1,853.93	$ 1,876.15	$ 1,875.97	$ 1,876.28	$ 1,882.72	$ 1,847.98	$ 1,853.93	$ 1,854.12	$ 1,852.52
Annual Energy Natural Gas [m3/yr]	423.9	423.9	385.1	423.9	359.4	713.7	423.9	423.9	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 155.03	$ 307.87	$ 182.86	$ 182.86	$ 166.12	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45841	51565	45842	46489	45843	45622	51007	51853	51566	51133
Upgrade Package List	Pkg3331203034	Pkg4331302033	Pkg3331203034	Pkg3331303034	Pkg3331203034	Pkg3331202034	Pkg4321302034	Pkg4331402033	Pkg4331302033	Pkg4321303033
GHGI [kg/m2]	4.11	4.1	3.79	4.11	3.58	6.48	4.1	4.1	3.78	4.1
% ICC	3.5%	3.5%	3.6%	3.6%	3.6%	3.2%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.2	45.6	46.2	46.2	46.2	46	45	45.6	45.6	45.4
Output: MEUI [kWh/(m2 * yr)]	46.7	46	44.9	46.7	43.8	59.6	45.8	46	44.3	45.9
Output: Better than ERS (%)	5120.0%	5160.0%	5220.0%	5120.0%	5300.0%	4560.0%	5170.0%	5160.0%	5270.0%	5160.0%
Output: Better than Envelope (%)	4280.0%	4350.0%	4280.0%	4280.0%	4280.0%	4310.0%	4440.0%	4350.0%	4350.0%	4380.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5386	5230	5387	5386	5388	5433	5188	5230	5231	5220
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 759.36	$ 737.39	$ 759.54	$ 759.36	$ 759.67	$ 766.08	$ 731.47	$ 737.39	$ 737.59	$ 735.99
Annual savings in carbon tax for electricity [$/year]	$ 2.69	$ 2.61	$ 2.69	$ 2.69	$ 2.69	$ 2.72	$ 2.59	$ 2.61	$ 2.62	$ 2.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 762.05	$ 740.	$ 762.23	$ 762.05	$ 762.36	$ 768.8	$ 734.06	$ 740.	$ 740.2	$ 738.6
Annual savings in GHG from electricity savings [kg CO2e/year]	59.2	57.5	59.3	59.2	59.3	59.8	57.1	57.5	57.5	57.4
Annual savings in natural gas [m3/year]	117.73	117.73	119.18	117.73	120.14	106.94	117.73	117.73	119.18	117.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,090.81	$ 1,090.81	$ 1,104.2	$ 1,090.81	$ 1,113.08	$ 990.77	$ 1,090.81	$ 1,090.81	$ 1,104.2	$ 1,090.81
Annual savings in carbon tax for natural gas [$/year]	$ 272.26	$ 272.26	$ 275.6	$ 272.26	$ 277.82	$ 247.29	$ 272.26	$ 272.26	$ 275.6	$ 272.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,363.07	$ 1,363.07	$ 1,379.81	$ 1,363.07	$ 1,390.89	$ 1,238.06	$ 1,363.07	$ 1,363.07	$ 1,379.81	$ 1,363.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	6050.2	6050.2	6124.5	6050.2	6173.7	5495.4	6050.2	6050.2	6124.5	6050.2
Net Present Value [$]	$ 5,514.83	$ 5,437.82	$ 5,743.21	$ 5,975.71	$ 5,830.11	$ 6,828.2	$ 5,514.8	$ 5,734.1	$ 5,666.57	$ 5,734.08
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	14.09	14.09	14.09	10.51	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,078.15	$ 24,374.43	$ 24,820.54	$ 25,116.82	$ 18,442.25	$ 18,627.32	$ 18,118.12	$ 18,942.25	$ 18,992.25	$ 18,764.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,165.38	$ 36,610.39	$ 37,280.45	$ 37,725.46	$ 27,700.26	$ 27,978.23	$ 27,213.42	$ 28,451.26	$ 28,526.36	$ 28,183.63
Net Present Value [$]	$ 2,500.19	$ 2,796.47	$ 3,138.9	$ 3,435.18	$ 5,437.82	$ 5,514.8	$ 5,514.83	$ 5,624.68	$ 5,666.57	$ 5,734.08
Incremental dollars per GHG saving	$ 5.23	$ 5.3	$ 5.37	$ 5.43	$ 3.08	$ 3.11	$ 3.02	$ 3.16	$ 3.13	$ 3.13
Auxiliary Energy Required Heating [GJ/yr]	29.5	29.5	29.1	29.1	38.5	37.9	39	37.3	38.5	38.3
Annual Energy DHW [GJ/yr]	13.4	13.4	13.4	13.4	15.8	15.8	15.8	15.8	14.3	15.8
Annual Energy Space Heating [GJ/yr]	31.3	31.3	30.8	30.8	20.2	20.1	20.8	19.8	20.2	20.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	72	72	71.5	71.5	64.6	64.4	65.1	64.1	63.1	64.5
Design Heating Load [W]	7039	7039	6986.7	6986.7	8120.8	8151	8514.6	8075.8	8120.8	8133.2
Annual Energy Electricity [kWh/yr]	7747.4	7747.4	7745.2	7745.2	13549.4	13507.4	13705.2	13427.8	13550.8	13539.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,032.94	$ 1,032.94	$ 1,032.63	$ 1,032.63	$ 1,853.93	$ 1,847.98	$ 1,875.97	$ 1,836.72	$ 1,854.12	$ 1,852.52
Annual Energy Natural Gas [m3/yr]	1183.6	1183.6	1171.9	1171.9	423.9	423.9	423.9	423.9	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 510.56	$ 510.56	$ 505.52	$ 505.52	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51792	52080	52368	52656	51565	51007	45841	51583	51566	51133
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4341303054	Pkg4341403054	Pkg4331302033	Pkg4321302034	Pkg3331203034	Pkg4331302034	Pkg4331302033	Pkg4321303033
GHGI [kg/m2]	10.03	10.03	9.94	9.94	4.1	4.1	4.11	4.09	3.78	4.1
% ICC	4.6%	4.7%	4.7%	4.8%	3.5%	3.6%	3.5%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	35	35	34.5	34.5	45.6	45	46.2	44.2	45.6	45.4
Output: MEUI [kWh/(m2 * yr)]	54.9	54.9	54.4	54.4	46	45.8	46.7	45.5	44.3	45.9
Output: Better than ERS (%)	4730.0%	4730.0%	4760.0%	4760.0%	5160.0%	5170.0%	5120.0%	5190.0%	5270.0%	5160.0%
Output: Better than Envelope (%)	5670.0%	5670.0%	5730.0%	5730.0%	4350.0%	4440.0%	4280.0%	4530.0%	4350.0%	4380.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	572	572	574	574	5230	5188	5386	5108	5231	5220
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 80.69	$ 80.69	$ 81.	$ 81.	$ 737.39	$ 731.47	$ 759.36	$ 720.24	$ 737.59	$ 735.99
Annual savings in carbon tax for electricity [$/year]	$ .29	$ .29	$ .29	$ .29	$ 2.61	$ 2.59	$ 2.69	$ 2.55	$ 2.62	$ 2.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 80.98	$ 80.98	$ 81.29	$ 81.29	$ 740.	$ 734.06	$ 762.05	$ 722.8	$ 740.2	$ 738.6
Annual savings in GHG from electricity savings [kg CO2e/year]	6.3	6.3	6.3	6.3	57.5	57.1	59.2	56.2	57.5	57.4
Annual savings in natural gas [m3/year]	89.43	89.43	89.86	89.86	117.73	117.73	117.73	117.73	119.18	117.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 828.56	$ 828.56	$ 832.6	$ 832.6	$ 1,090.81	$ 1,090.81	$ 1,090.81	$ 1,090.81	$ 1,104.2	$ 1,090.81
Annual savings in carbon tax for natural gas [$/year]	$ 206.8	$ 206.8	$ 207.81	$ 207.81	$ 272.26	$ 272.26	$ 272.26	$ 272.26	$ 275.6	$ 272.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,035.36	$ 1,035.36	$ 1,040.41	$ 1,040.41	$ 1,363.07	$ 1,363.07	$ 1,363.07	$ 1,363.07	$ 1,379.81	$ 1,363.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	4595.6	4595.6	4618.1	4618.1	6050.2	6050.2	6050.2	6050.2	6124.5	6050.2
Net Present Value [$]	$ 2,500.19	$ 2,796.47	$ 3,138.9	$ 3,435.18	$ 5,437.82	$ 5,514.8	$ 5,514.83	$ 5,624.68	$ 5,666.57	$ 5,734.08
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	10.51	10.51	14.09	10.51	10.51	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 1,286.55	$ 1,286.55	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 6,500.59	$ 6,721.33	$ 6,815.52	$ 7,036.26	$ 7,050.59	$ 7,100.59	$ 7,252.15	$ 7,271.33	$ 7,321.33	$ 7,350.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,763.89	$ 10,095.44	$ 10,236.91	$ 10,568.46	$ 10,589.99	$ 10,665.09	$ 10,892.73	$ 10,921.54	$ 10,996.64	$ 11,040.59
Net Present Value [$]	$ 8,238.26	$ 8,209.12	$ 8,127.13	$ 8,097.02	$ 8,085.23	$ 9,882.22	$ 8,721.61	$ 8,056.09	$ 9,853.81	$ 8,049.23
Incremental dollars per GHG saving	$ 2.21	$ 2.26	$ 2.28	$ 2.33	$ 2.33	$ 2.06	$ 2.24	$ 2.37	$ 2.09	$ 2.38
Auxiliary Energy Required Heating [GJ/yr]	75.1	74.4	74.3	73.6	75.1	75.9	80	74.4	75.1	75.1
Annual Energy DHW [GJ/yr]	27	27	27	27	25.2	16.2	16.2	25.2	16.2	24
Annual Energy Space Heating [GJ/yr]	79.6	78.8	78.7	77.9	79.6	80.4	84.7	78.8	79.6	79.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	133	132.2	132.1	131.3	131.2	123	127.3	130.4	122.2	130
Design Heating Load [W]	12706.3	12592.1	12624	12509.7	12706.3	12260.7	12260.7	12592.1	12146.5	12706.3
Annual Energy Electricity [kWh/yr]	7731.4	7727.3	7727.1	7723	7731.4	7735.4	7757	7727.3	7731.3	7731.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,030.68	$ 1,030.1	$ 1,030.07	$ 1,029.49	$ 1,030.68	$ 1,031.24	$ 1,034.3	$ 1,030.1	$ 1,030.66	$ 1,030.68
Annual Energy Natural Gas [m3/yr]	2823.6	2802	2800.6	2779.1	2776.2	2554.5	2668.3	2754.6	2532.8	2744.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,218.	$ 1,208.69	$ 1,208.08	$ 1,198.81	$ 1,197.56	$ 1,101.92	$ 1,151.01	$ 1,188.24	$ 1,092.56	$ 1,183.97
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	13069	13339	11450	11452	11398	11720	11722	11451
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg2121101021	Pkg2121102031	Pkg2121102031	Pkg2121101031
GHGI [kg/m2]	23.43	23.25	23.24	23.06	23.04	21.23	22.16	22.86	21.05	22.78
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	89.1	88.1	88.1	87.2	89.1	90	94.8	88.1	89	89.1
Output: MEUI [kWh/(m2 * yr)]	127.2	126.3	126.2	125.2	125.1	115.4	120.5	124.2	114.4	123.7
Output: Better than ERS (%)	2130.0%	2180.0%	2190.0%	2240.0%	2240.0%	2410.0%	2150.0%	2290.0%	2460.0%	2310.0%
Output: Better than Envelope (%)	220.0%	310.0%	330.0%	420.0%	220.0%	120.0%	420.0%	310.0%	220.0%	220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	744	748	748	752	744	740	718	748	744	744
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 104.83	$ 105.41	$ 105.44	$ 106.02	$ 104.83	$ 104.27	$ 101.22	$ 105.41	$ 104.85	$ 104.83
Annual savings in carbon tax for electricity [$/year]	$ .37	$ .37	$ .37	$ .38	$ .37	$ .37	$ .36	$ .37	$ .37	$ .37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 105.21	$ 105.79	$ 105.81	$ 106.39	$ 105.21	$ 104.64	$ 101.58	$ 105.79	$ 105.22	$ 105.21
Annual savings in GHG from electricity savings [kg CO2e/year]	8.2	8.2	8.2	8.3	8.2	8.1	7.9	8.2	8.2	8.2
Annual savings in natural gas [m3/year]	57.05	57.85	57.9	58.71	58.81	67.07	62.83	59.62	67.88	59.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 528.54	$ 536.	$ 536.48	$ 543.9	$ 544.9	$ 621.44	$ 582.15	$ 552.36	$ 628.93	$ 555.78
Annual savings in carbon tax for natural gas [$/year]	$ 131.92	$ 133.78	$ 133.9	$ 135.76	$ 136.01	$ 155.11	$ 145.3	$ 137.87	$ 156.98	$ 138.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 660.46	$ 669.78	$ 670.38	$ 679.66	$ 680.91	$ 776.54	$ 727.45	$ 690.23	$ 785.9	$ 694.5
Annual savings in GHG from natural gas savings [kg CO2e/year]	2931.6	2972.9	2975.6	3016.8	3022.3	3446.8	3228.9	3063.7	3488.4	3082.7
Net Present Value [$]	$ 8,238.26	$ 8,209.12	$ 8,127.13	$ 8,097.02	$ 8,085.23	$ 9,882.22	$ 8,721.61	$ 8,056.09	$ 9,853.81	$ 8,049.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.

MEDIUM 018WWR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 9,750.59	$ 9,150.59	$ 11,024.59	$ 9,971.33	$ 10,065.52	$ 11,245.33	$ 10,147.51	$ 9,371.33	$ 10,300.59	$ 11,339.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 14,645.39	$ 13,744.19	$ 16,558.93	$ 14,976.94	$ 15,118.41	$ 16,890.49	$ 15,241.56	$ 14,075.74	$ 15,471.49	$ 17,031.96
Net Present Value [$]	$ 9,408.94	$ 11,308.09	$ 12,377.1	$ 9,376.8	$ 9,441.96	$ 12,273.56	$ 8,738.65	$ 11,257.69	$ 9,625.08	$ 12,350.59
Incremental dollars per GHG saving	$ 1.32	$ 1.34	$ 1.35	$ 1.35	$ 1.37	$ 1.38	$ 1.38	$ 1.38	$ 1.38	$ 1.39
Auxiliary Energy Required Heating [GJ/yr]	84	83.4	81.8	83.3	83.2	81	84.9	82.6	84	81
Annual Energy DHW [GJ/yr]	16.2	27	9.3	16.2	16.2	9.3	16.2	27	14.7	9.3
Annual Energy Space Heating [GJ/yr]	47.7	47.8	46	47.3	47.3	45.5	46.9	47.4	47.7	45.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	92.1	103	83.4	91.8	91.7	83	90.6	102.7	90.6	82.9
Design Heating Load [W]	13770.2	14224.2	12808.2	13655.9	13687.8	12693.9	12692.1	14110	13770.2	12725.8
Annual Energy Electricity [kWh/yr]	21098.3	21121.9	23168.7	21000.1	20988.8	23042.8	20683.8	21016.6	21100	23036.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,922.09	$ 2,925.43	$ 3,215.06	$ 2,908.2	$ 2,906.6	$ 3,197.24	$ 2,863.44	$ 2,910.53	$ 2,922.33	$ 3,196.29
Annual Energy Natural Gas [m3/yr]	434.1	725.2	0	434.1	434.1	0	434.1	725.2	393.7	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 312.83	$.	$ 187.26	$ 187.26	$.	$ 187.26	$ 312.83	$ 169.83	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1741	1738	11464	2011	3361	11734	17725	2008	1742	13084
Upgrade Package List	Pkg1121101031	Pkg1121101031	Pkg2121101031	Pkg1121102031	Pkg1131101031	Pkg2121102031	Pkg2221101011	Pkg1121102031	Pkg1121101031	Pkg2131101031
GHGI [kg/m2]	4.54	6.92	1.09	4.53	4.53	1.08	4.52	6.91	4.21	1.08
% ICC	1.9%	1.8%	2.1%	1.9%	1.9%	2.2%	1.9%	1.8%	2.0%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	99.6	98.8	96.9	98.7	98.6	96	100.6	97.9	99.6	96
Output: MEUI [kWh/(m2 * yr)]	78.5	91.4	68.2	78.1	78	67.6	76.9	91	76.7	67.6
Output: Better than ERS (%)	4170.0%	3760.0%	4770.0%	4190.0%	4200.0%	4800.0%	4270.0%	3780.0%	4270.0%	4800.0%
Output: Better than Envelope (%)	940.0%	860.0%	650.0%	850.0%	830.0%	550.0%	1050.0%	760.0%	940.0%	550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12623	12647	14694	12525	12514	14568	12209	12542	12625	14561
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,779.9	$ 1,783.23	$ 2,071.83	$ 1,766.05	$ 1,764.46	$ 2,054.07	$ 1,721.45	$ 1,768.38	$ 1,780.14	$ 2,053.13
Annual savings in carbon tax for electricity [$/year]	$ 6.31	$ 6.32	$ 7.35	$ 6.26	$ 6.26	$ 7.28	$ 6.1	$ 6.27	$ 6.31	$ 7.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,786.21	$ 1,789.55	$ 2,079.17	$ 1,772.32	$ 1,770.72	$ 2,061.36	$ 1,727.56	$ 1,774.65	$ 1,786.45	$ 2,060.41
Annual savings in GHG from electricity savings [kg CO2e/year]	138.9	139.1	161.6	137.8	137.7	160.2	134.3	138	138.9	160.2
Annual savings in natural gas [m3/year]	146.08	135.23	162.25	146.08	146.08	162.25	146.08	135.23	147.58	162.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,353.41	$ 1,252.92	$ 1,503.26	$ 1,353.41	$ 1,353.41	$ 1,503.26	$ 1,353.41	$ 1,252.92	$ 1,367.35	$ 1,503.26
Annual savings in carbon tax for natural gas [$/year]	$ 337.8	$ 312.72	$ 375.21	$ 337.8	$ 337.8	$ 375.21	$ 337.8	$ 312.72	$ 341.28	$ 375.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,691.21	$ 1,565.64	$ 1,878.47	$ 1,691.21	$ 1,691.21	$ 1,878.47	$ 1,691.21	$ 1,565.64	$ 1,708.64	$ 1,878.47
Annual savings in GHG from natural gas savings [kg CO2e/year]	7506.8	6949.4	8337.9	7506.8	7506.8	8337.9	7506.8	6949.4	7584.1	8337.9
Net Present Value [$]	$ 9,408.94	$ 11,308.09	$ 12,377.1	$ 9,376.8	$ 9,441.96	$ 12,273.56	$ 8,738.65	$ 11,257.69	$ 9,625.08	$ 12,350.59
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$.	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.	$.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 018WWR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,100.59	$ 8,563.63	$ 7,321.33	$ 8,784.37	$ 7,415.52	$ 8,878.56	$ 7,636.26	$ 9,099.3	$ 7,650.59	$ 9,113.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,665.09	$ 12,862.57	$ 10,996.64	$ 13,194.12	$ 11,138.11	$ 13,335.6	$ 11,469.66	$ 13,667.15	$ 11,491.19	$ 13,688.67
Net Present Value [$]	$ 9,882.22	$ 9,868.28	$ 9,853.81	$ 9,839.69	$ 9,767.32	$ 9,751.87	$ 9,738.91	$ 9,722.73	$ 9,667.86	$ 9,654.1
Incremental dollars per GHG saving	$ 2.06	$ 2.27	$ 2.09	$ 2.31	$ 2.12	$ 2.33	$ 2.16	$ 2.36	$ 2.17	$ 2.37
Auxiliary Energy Required Heating [GJ/yr]	75.9	70.1	75.1	69.3	75.1	69.3	74.3	68.5	75.9	70.1
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.7	14.7
Annual Energy Space Heating [GJ/yr]	80.4	74.2	79.6	73.4	79.6	73.4	78.7	72.5	80.4	74.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	123	116.8	122.2	116	122.1	115.9	121.3	115.1	121.5	115.3
Design Heating Load [W]	12260.7	11640	12146.5	11525.7	12178.4	11557.6	12064.1	11443.4	12260.7	11640
Annual Energy Electricity [kWh/yr]	7735.4	7704.5	7731.3	7700.4	7731.2	7700.2	7727.1	7696.1	7735.5	7704.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,031.24	$ 1,026.87	$ 1,030.66	$ 1,026.29	$ 1,030.65	$ 1,026.26	$ 1,030.07	$ 1,025.68	$ 1,031.26	$ 1,026.87
Annual Energy Natural Gas [m3/yr]	2554.5	2391	2532.8	2369.3	2531.9	2368.6	2510.2	2347	2514.4	2350.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,101.92	$ 1,031.39	$ 1,092.56	$ 1,022.03	$ 1,092.17	$ 1,021.73	$ 1,082.81	$ 1,012.41	$ 1,084.62	$ 1,014.1
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	17824	11722	18094	13072	20956	13342	21226	11453	17825
Upgrade Package List	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2221102031	Pkg2131101031	Pkg2231101031	Pkg2131102031	Pkg2231102031	Pkg2121101031	Pkg2221101031
GHGI [kg/m2]	21.23	19.89	21.05	19.72	21.04	19.71	20.87	19.53	20.9	19.57
% ICC	1.4%	1.6%	1.4%	1.7%	1.4%	1.7%	1.5%	1.7%	1.5%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	90	83	89	82.1	89	82.1	88.1	81.2	90	83
Output: MEUI [kWh/(m2 * yr)]	115.4	108	114.4	107	114.4	107	113.4	106	113.6	106.3
Output: Better than ERS (%)	2410.0%	2790.0%	2460.0%	2840.0%	2470.0%	2850.0%	2520.0%	2900.0%	2500.0%	2890.0%
Output: Better than Envelope (%)	120.0%	870.0%	220.0%	980.0%	220.0%	980.0%	330.0%	1080.0%	120.0%	870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	740	770	744	774	744	775	748	779	739	770
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 104.27	$ 108.63	$ 104.85	$ 109.2	$ 104.86	$ 109.23	$ 105.44	$ 109.81	$ 104.26	$ 108.63
Annual savings in carbon tax for electricity [$/year]	$ .37	$ .39	$ .37	$ .39	$ .37	$ .39	$ .37	$ .39	$ .37	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 104.64	$ 109.01	$ 105.22	$ 109.59	$ 105.23	$ 109.62	$ 105.81	$ 110.2	$ 104.63	$ 109.01
Annual savings in GHG from electricity savings [kg CO2e/year]	8.1	8.5	8.2	8.5	8.2	8.5	8.2	8.6	8.1	8.5
Annual savings in natural gas [m3/year]	67.07	73.17	67.88	73.97	67.92	74	68.72	74.8	68.57	74.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 621.44	$ 677.88	$ 628.93	$ 685.37	$ 629.24	$ 685.61	$ 636.73	$ 693.07	$ 635.28	$ 691.72
Annual savings in carbon tax for natural gas [$/year]	$ 155.11	$ 169.19	$ 156.98	$ 171.06	$ 157.05	$ 171.12	$ 158.92	$ 172.99	$ 158.56	$ 172.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 776.54	$ 847.07	$ 785.9	$ 856.43	$ 786.29	$ 856.73	$ 795.65	$ 866.05	$ 793.84	$ 864.37
Annual savings in GHG from natural gas savings [kg CO2e/year]	3446.8	3759.9	3488.4	3801.4	3490.1	3802.8	3531.7	3844.1	3523.6	3836.7
Net Present Value [$]	$ 9,882.22	$ 9,868.28	$ 9,853.81	$ 9,839.69	$ 9,767.32	$ 9,751.87	$ 9,738.91	$ 9,722.73	$ 9,667.86	$ 9,654.1
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	3.87	5.28	3.87	5.28	3.87	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

MEDIUM 018WWR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 13,449.3	$ 13,999.3	$ 14,299.3	$ 14,430.34	$ 14,651.08	$ 14,745.27	$ 14,870.34	$ 14,870.34	$ 14,891.22	$ 14,905.7
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,200.85	$ 21,026.95	$ 21,477.55	$ 21,674.37	$ 22,005.92	$ 22,147.4	$ 22,335.25	$ 22,335.25	$ 22,366.61	$ 22,388.36
Net Present Value [$]	$ 8,570.63	$ 8,723.67	$ 8,759.67	$ 9,243.16	$ 9,222.89	$ 9,289.58	$ 8,788.86	$ 10,229.2	$ 9,704.04	$ 10,026.23
Incremental dollars per GHG saving	$ 1.97	$ 2.02	$ 2.05	$ 2.11	$ 2.14	$ 2.16	$ 2.17	$ 2.18	$ 2.18	$ 2.18
Auxiliary Energy Required Heating [GJ/yr]	63.3	63.3	63.3	63.1	62.3	62.3	60.7	63.7	63.1	63.3
Annual Energy DHW [GJ/yr]	27	25.3	24.1	27	27	27	27	27	27	27
Annual Energy Space Heating [GJ/yr]	36.9	36.9	36.9	36.4	36.1	36.1	35.2	37.2	36.4	36.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	93.2	91.4	90.3	92.8	92.5	92.4	91.5	93.6	92.8	93.2
Design Heating Load [W]	10884.4	10884.4	10884.4	10584.4	10470.2	10502.1	10359.9	11032.9	10584.4	10878.8
Annual Energy Electricity [kWh/yr]	18387.5	18387.5	18387.5	18267.3	18173.4	18164.3	17919.4	18477.5	18267.3	18385.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,538.52	$ 2,538.52	$ 2,538.52	$ 2,521.51	$ 2,508.22	$ 2,506.93	$ 2,472.28	$ 2,551.25	$ 2,521.51	$ 2,538.29
Annual Energy Natural Gas [m3/yr]	725.6	678.2	646.7	725.7	725.8	725.3	725.9	726.3	725.7	726
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.	$ 292.55	$ 278.96	$ 313.04	$ 313.08	$ 312.87	$ 313.13	$ 313.3	$ 313.04	$ 313.17
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21268	21269	21270	35650	35866	37594	35668	18424	36298	27874
Upgrade Package List	Pkg2231102033	Pkg2231102033	Pkg2231102033	Pkg3221201032	Pkg3221202032	Pkg3231201032	Pkg3221201033	Pkg2221201034	Pkg3221301032	Pkg2321201032
GHGI [kg/m2]	6.79	6.4	6.15	6.79	6.78	6.78	6.77	6.8	6.79	6.79
% ICC	2.6%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	75.1	75.1	75.1	74.8	73.9	73.8	71.9	75.4	74.8	75.1
Output: MEUI [kWh/(m2 * yr)]	79.8	77.7	76.3	79.3	78.9	78.8	77.8	80.2	79.3	79.8
Output: Better than ERS (%)	4350.0%	4460.0%	4530.0%	4380.0%	4390.0%	4400.0%	4450.0%	4330.0%	4380.0%	4350.0%
Output: Better than Envelope (%)	1760.0%	1760.0%	1760.0%	1780.0%	1890.0%	1890.0%	2100.0%	1710.0%	1780.0%	1760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9913	9913	9913	9792	9698	9689	9444	10003	9792	9911
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,397.68	$ 1,397.68	$ 1,397.68	$ 1,380.73	$ 1,367.49	$ 1,366.21	$ 1,331.67	$ 1,410.37	$ 1,380.73	$ 1,397.45
Annual savings in carbon tax for electricity [$/year]	$ 4.96	$ 4.96	$ 4.96	$ 4.9	$ 4.85	$ 4.84	$ 4.72	$ 5.	$ 4.9	$ 4.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,402.63	$ 1,402.63	$ 1,402.63	$ 1,385.62	$ 1,372.34	$ 1,371.05	$ 1,336.4	$ 1,415.37	$ 1,385.62	$ 1,402.41
Annual savings in GHG from electricity savings [kg CO2e/year]	109	109	109	107.7	106.7	106.6	103.9	110	107.7	109
Annual savings in natural gas [m3/year]	135.22	136.98	138.16	135.21	135.21	135.23	135.21	135.19	135.21	135.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,252.78	$ 1,269.14	$ 1,280.02	$ 1,252.74	$ 1,252.71	$ 1,252.88	$ 1,252.68	$ 1,252.54	$ 1,252.74	$ 1,252.64
Annual savings in carbon tax for natural gas [$/year]	$ 312.69	$ 316.77	$ 319.49	$ 312.68	$ 312.67	$ 312.71	$ 312.66	$ 312.63	$ 312.68	$ 312.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,565.47	$ 1,585.91	$ 1,599.5	$ 1,565.42	$ 1,565.38	$ 1,565.6	$ 1,565.34	$ 1,565.17	$ 1,565.42	$ 1,565.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	6948.6	7039.4	7099.7	6948.4	6948.2	6949.2	6948	6947.3	6948.4	6947.9
Net Present Value [$]	$ 8,570.63	$ 8,723.67	$ 8,759.67	$ 9,243.16	$ 9,222.89	$ 9,289.58	$ 8,788.86	$ 10,229.2	$ 9,704.04	$ 10,026.23
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	8.78	10.51	8.78	8.78	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 018WWR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,449.3	$ 13,999.3	$ 14,299.3	$ 15,251.08	$ 15,345.27	$ 15,470.34	$ 17,219.7	$ 15,566.01	$ 14,430.34	$ 15,801.08
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,200.85	$ 21,026.95	$ 21,477.55	$ 22,907.12	$ 23,048.6	$ 23,236.45	$ 25,863.99	$ 23,380.15	$ 21,674.37	$ 23,733.22
Net Present Value [$]	$ 8,570.63	$ 8,723.67	$ 8,759.67	$ 7,350.6	$ 7,432.19	$ 6,916.02	$ 12,347.34	$ 7,323.54	$ 9,243.16	$ 7,566.36
Incremental dollars per GHG saving	$ 1.97	$ 2.02	$ 2.05	$ 2.06	$ 2.07	$ 2.09	$ 2.1	$ 2.1	$ 2.11	$ 2.11
Auxiliary Energy Required Heating [GJ/yr]	63.3	63.3	63.3	63.1	63.1	61.4	63.2	62.3	63.1	63.1
Annual Energy DHW [GJ/yr]	27	25.3	24.1	16.2	16.2	16.2	9.3	16.2	27	14.7
Annual Energy Space Heating [GJ/yr]	36.9	36.9	36.9	36.1	36	35.1	36	35.6	36.4	36.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	93.2	91.4	90.3	81.6	81.5	80.6	74.7	81.1	92.8	80
Design Heating Load [W]	10884.4	10884.4	10884.4	10040.5	10072.4	9930.3	9933.2	9958.1	10584.4	10040.5
Annual Energy Electricity [kWh/yr]	18387.5	18387.5	18387.5	18162.2	18157.3	17908.2	20750.8	18029.4	18267.3	18163.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,538.52	$ 2,538.52	$ 2,538.52	$ 2,506.64	$ 2,505.94	$ 2,470.7	$ 2,872.92	$ 2,487.85	$ 2,521.51	$ 2,506.86
Annual Energy Natural Gas [m3/yr]	725.6	678.2	646.7	434.1	434.1	434.1	0	434.1	725.7	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.	$ 292.55	$ 278.96	$ 187.26	$ 187.26	$ 187.26	$.	$ 187.26	$ 313.04	$ 169.83
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21268	21269	21270	35869	37597	35671	43450	37813	35650	35870
Upgrade Package List	Pkg2231102033	Pkg2231102033	Pkg2231102033	Pkg3221202032	Pkg3231201032	Pkg3321201033	Pkg3321201033	Pkg3231202032	Pkg3221201032	Pkg3221202032
GHGI [kg/m2]	6.79	6.4	6.15	4.4	4.4	4.39	0.97	4.39	6.79	4.07
% ICC	2.6%	2.7%	2.7%	2.9%	2.9%	3.0%	3.3%	3.0%	2.8%	3.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.1	75.1	75.1	74.8	74.8	72.8	75	73.9	74.8	74.8
Output: MEUI [kWh/(m2 * yr)]	79.8	77.7	76.3	65.9	65.9	64.9	57.8	65.4	79.3	64.2
Output: Better than ERS (%)	4350.0%	4460.0%	4530.0%	4840.0%	4840.0%	4900.0%	5320.0%	4870.0%	4380.0%	4940.0%
Output: Better than Envelope (%)	1760.0%	1760.0%	1760.0%	1780.0%	1780.0%	2010.0%	1770.0%	1890.0%	1780.0%	1780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9913	9913	9913	9687	9682	9433	12276	9554	9792	9689
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,397.68	$ 1,397.68	$ 1,397.68	$ 1,365.91	$ 1,365.22	$ 1,330.1	$ 1,730.9	$ 1,347.18	$ 1,380.73	$ 1,366.13
Annual savings in carbon tax for electricity [$/year]	$ 4.96	$ 4.96	$ 4.96	$ 4.84	$ 4.84	$ 4.72	$ 6.14	$ 4.78	$ 4.9	$ 4.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,402.63	$ 1,402.63	$ 1,402.63	$ 1,370.75	$ 1,370.06	$ 1,334.81	$ 1,737.04	$ 1,351.96	$ 1,385.62	$ 1,370.98
Annual savings in GHG from electricity savings [kg CO2e/year]	109	109	109	106.6	106.5	103.8	135	105.1	107.7	106.6
Annual savings in natural gas [m3/year]	135.22	136.98	138.16	146.08	146.08	146.08	162.25	146.08	135.21	147.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,252.78	$ 1,269.14	$ 1,280.02	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,503.26	$ 1,353.41	$ 1,252.74	$ 1,367.35
Annual savings in carbon tax for natural gas [$/year]	$ 312.69	$ 316.77	$ 319.49	$ 337.8	$ 337.8	$ 337.8	$ 375.21	$ 337.8	$ 312.68	$ 341.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,565.47	$ 1,585.91	$ 1,599.5	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,878.47	$ 1,691.21	$ 1,565.42	$ 1,708.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	6948.6	7039.4	7099.7	7506.8	7506.8	7506.8	8337.9	7506.8	6948.4	7584.1
Net Present Value [$]	$ 8,570.63	$ 8,723.67	$ 8,759.67	$ 7,350.6	$ 7,432.19	$ 6,916.02	$ 12,347.34	$ 7,323.54	$ 9,243.16	$ 7,566.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	8.78	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	7.04	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 5,588.	$ 4,612.64	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM 018WWR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,142.25	$ 16,327.32	$ 16,342.25	$ 16,642.25	$ 16,464.07	$ 16,438.53	$ 16,429.	$ 16,479.	$ 16,623.6	$ 16,664.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,245.66	$ 24,523.63	$ 24,546.06	$ 24,996.66	$ 24,729.03	$ 24,690.67	$ 24,676.36	$ 24,751.46	$ 24,968.65	$ 25,029.43
Net Present Value [$]	$ 6,435.49	$ 6,359.51	$ 6,311.74	$ 6,234.12	$ 6,169.43	$ 6,139.21	$ 6,134.83	$ 6,122.57	$ 6,063.23	$ 6,046.65
Incremental dollars per GHG saving	$ 3.35	$ 3.38	$ 3.39	$ 3.41	$ 3.41	$ 3.42	$ 3.42	$ 3.42	$ 3.44	$ 3.44
Auxiliary Energy Required Heating [GJ/yr]	52.9	52.5	51.7	51.7	52.7	52.9	50.7	51.9	52.5	51.5
Annual Energy DHW [GJ/yr]	13.7	13.7	14.7	13.7	13.7	13.7	16.2	14.7	13.7	14.7
Annual Energy Space Heating [GJ/yr]	56	55.6	54.8	54.8	55.8	56	53.7	55	55.6	54.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	97	96.6	96.8	96.8	96.8	97	97.2	97	96.6	96.5
Design Heating Load [W]	8657.4	8691.6	8609.3	8609.3	8672.5	8657.4	8542	8590.1	8691.6	8624.4
Annual Energy Electricity [kWh/yr]	7871.2	7868.8	7864.7	7864.8	7870	7871.2	7859.4	7865.8	7868.8	7863.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,050.46	$ 1,050.12	$ 1,049.54	$ 1,049.55	$ 1,050.29	$ 1,050.46	$ 1,048.79	$ 1,049.7	$ 1,050.12	$ 1,049.37
Annual Energy Natural Gas [m3/yr]	1844.8	1832.5	1837.7	1811.1	1838.5	1844.8	1850.1	1843.6	1832.5	1831.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 795.78	$ 790.48	$ 792.72	$ 781.25	$ 793.06	$ 795.78	$ 798.07	$ 795.26	$ 790.48	$ 789.96
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51558	51000	51575	51576	51126	51846	51718	51701	51288	51143
Upgrade Package List	Pkg4331302033	Pkg4321302034	Pkg4331302034	Pkg4331302034	Pkg4321303033	Pkg4331402033	Pkg4331303034	Pkg4331303033	Pkg4321402034	Pkg4321303034
GHGI [kg/m2]	15.44	15.34	15.38	15.16	15.39	15.44	15.48	15.43	15.34	15.33
% ICC	3.1%	3.1%	3.1%	3.2%	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	62.7	62.2	61.3	61.3	62.4	62.7	60.1	61.5	62.2	61
Output: MEUI [kWh/(m2 * yr)]	84.6	84.1	84.3	83.1	84.3	84.6	84.8	84.6	84.1	84
Output: Better than ERS (%)	4020.0%	4040.0%	4030.0%	4090.0%	4030.0%	4020.0%	4000.0%	4020.0%	4040.0%	4050.0%
Output: Better than Envelope (%)	3110.0%	3160.0%	3270.0%	3270.0%	3140.0%	3110.0%	3400.0%	3240.0%	3160.0%	3290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	604	606	610	610	605	604	616	609	606	611
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 85.12	$ 85.46	$ 86.04	$ 86.02	$ 85.29	$ 85.12	$ 86.79	$ 85.88	$ 85.46	$ 86.21
Annual savings in carbon tax for electricity [$/year]	$ .3	$ .3	$ .31	$ .31	$ .3	$ .3	$ .31	$ .3	$ .3	$ .31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 85.42	$ 85.76	$ 86.34	$ 86.33	$ 85.59	$ 85.42	$ 87.09	$ 86.19	$ 85.76	$ 86.51
Annual savings in GHG from electricity savings [kg CO2e/year]	6.6	6.7	6.7	6.7	6.7	6.6	6.8	6.7	6.7	6.7
Annual savings in natural gas [m3/year]	93.52	93.97	93.78	94.77	93.75	93.52	93.32	93.56	93.97	94.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 866.43	$ 870.67	$ 868.88	$ 878.06	$ 868.6	$ 866.43	$ 864.6	$ 866.84	$ 870.67	$ 871.09
Annual savings in carbon tax for natural gas [$/year]	$ 216.26	$ 217.32	$ 216.87	$ 219.16	$ 216.8	$ 216.26	$ 215.8	$ 216.36	$ 217.32	$ 217.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,082.68	$ 1,087.99	$ 1,085.75	$ 1,097.22	$ 1,085.4	$ 1,082.68	$ 1,080.4	$ 1,083.2	$ 1,087.99	$ 1,088.51
Annual savings in GHG from natural gas savings [kg CO2e/year]	4805.7	4829.2	4819.3	4870.2	4817.8	4805.7	4795.5	4808	4829.2	4831.5
Net Present Value [$]	$ 6,435.49	$ 6,359.51	$ 6,311.74	$ 6,234.12	$ 6,169.43	$ 6,139.21	$ 6,134.83	$ 6,122.57	$ 6,063.23	$ 6,046.65
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	14.09	10.51	14.09	14.09	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$.	$ 550.	$ 850.	$ 550.

MEDIUM 018WWR Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85
Total increase in construction cost [$]	$ 22,644.85	$ 22,865.59	$ 22,959.78	$ 23,105.73	$ 23,144.85	$ 23,180.52	$ 23,194.85	$ 23,326.47	$ 23,351.11	$ 23,365.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,012.56	$ 34,344.12	$ 34,485.59	$ 34,704.81	$ 34,763.56	$ 34,817.14	$ 34,838.66	$ 35,036.36	$ 35,073.37	$ 35,095.12
Net Present Value [$]	$ 11,840.06	$ 11,793.13	$ 11,880.27	$ 12,300.94	$ 12,007.62	$ 11,831.15	$ 11,992.85	$ 12,254.01	$ 12,302.7	$ 11,958.38
Incremental dollars per GHG saving	$ 3.3	$ 3.33	$ 3.34	$ 3.37	$ 3.37	$ 3.38	$ 3.34	$ 3.4	$ 3.4	$ 3.4
Auxiliary Energy Required Heating [GJ/yr]	48	47.2	47.2	48	46.8	46.5	48	47.2	47.6	46.1
Annual Energy DHW [GJ/yr]	27.1	27.1	27	27.1	27.1	27	25.3	27.1	27	27.1
Annual Energy Space Heating [GJ/yr]	28.5	28.1	28.1	28.5	28	27.7	28.5	28.1	28.1	27.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	85	84.6	84.6	85	84.5	84.2	83.2	84.6	84.6	84.1
Design Heating Load [W]	8978.2	8863.9	8895.8	8978.2	8930	8781.5	8978.2	8863.9	8684.5	8815.8
Annual Energy Electricity [kWh/yr]	16083	15978.7	15972.6	16083	15952.6	15872.8	16083	15978.7	15989	15847.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,212.43	$ 2,197.67	$ 2,197.52	$ 2,212.43	$ 2,193.98	$ 2,182.69	$ 2,212.43	$ 2,197.67	$ 2,199.13	$ 2,179.09
Annual Energy Natural Gas [m3/yr]	726.4	726.5	726	726.4	726.8	726	679	726.5	726.2	726.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.34	$ 313.39	$ 313.17	$ 313.34	$ 313.52	$ 313.17	$ 292.9	$ 313.39	$ 313.26	$ 313.56
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43552	43768	45496	44200	43570	45712	43553	44416	49330	43786
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3331201053	Pkg3321301053	Pkg3321201054	Pkg3331202053	Pkg3321201053	Pkg3321302053	Pkg4221302053	Pkg3321202054
GHGI [kg/m2]	6.69	6.68	6.68	6.69	6.69	6.68	6.3	6.68	6.68	6.68
% ICC	4.3%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.5%	4.5%	4.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	56.8	56	56	56.8	55.5	55.1	56.8	56	56.4	54.6
Output: MEUI [kWh/(m2 * yr)]	69.9	69.5	69.5	69.9	69.4	69	67.9	69.5	69.5	69
Output: Better than ERS (%)	4850.0%	4870.0%	4870.0%	4850.0%	4880.0%	4900.0%	4960.0%	4870.0%	4870.0%	4900.0%
Output: Better than Envelope (%)	3750.0%	3850.0%	3850.0%	3750.0%	3910.0%	3950.0%	3750.0%	3850.0%	3800.0%	4000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7608	7504	7503	7608	7478	7398	7608	7504	7514	7372
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,072.74	$ 1,058.04	$ 1,057.88	$ 1,072.74	$ 1,054.36	$ 1,043.1	$ 1,072.74	$ 1,058.04	$ 1,059.49	$ 1,039.52
Annual savings in carbon tax for electricity [$/year]	$ 3.8	$ 3.75	$ 3.75	$ 3.8	$ 3.74	$ 3.7	$ 3.8	$ 3.75	$ 3.76	$ 3.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,076.55	$ 1,061.79	$ 1,061.63	$ 1,076.55	$ 1,058.09	$ 1,046.8	$ 1,076.55	$ 1,061.79	$ 1,063.25	$ 1,043.21
Annual savings in GHG from electricity savings [kg CO2e/year]	83.7	82.5	82.5	83.7	82.3	81.4	83.7	82.5	82.7	81.1
Annual savings in natural gas [m3/year]	135.19	135.18	135.2	135.19	135.17	135.2	136.95	135.18	135.19	135.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,252.5	$ 1,252.47	$ 1,252.64	$ 1,252.5	$ 1,252.37	$ 1,252.64	$ 1,268.87	$ 1,252.47	$ 1,252.57	$ 1,252.33
Annual savings in carbon tax for natural gas [$/year]	$ 312.62	$ 312.61	$ 312.65	$ 312.62	$ 312.58	$ 312.65	$ 316.7	$ 312.61	$ 312.64	$ 312.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,565.12	$ 1,565.08	$ 1,565.29	$ 1,565.12	$ 1,564.95	$ 1,565.29	$ 1,585.57	$ 1,565.08	$ 1,565.21	$ 1,564.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	6947.1	6946.9	6947.9	6947.1	6946.3	6947.9	7037.8	6946.9	6947.5	6946.1
Net Present Value [$]	$ 11,840.06	$ 11,793.13	$ 11,880.27	$ 12,300.94	$ 12,007.62	$ 11,831.15	$ 11,992.85	$ 12,254.01	$ 12,302.7	$ 11,958.38
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 4,612.64	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM 018WWR Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 23,465.59	$ 23,559.78	$ 23,744.85	$ 24,015.59	$ 23,780.52	$ 24,109.78	$ 24,315.59	$ 23,926.47	$ 26,515.4	$ 23,965.59
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,245.32	$ 35,386.79	$ 35,664.76	$ 36,071.42	$ 35,718.34	$ 36,212.89	$ 36,522.02	$ 35,937.56	$ 39,826.13	$ 35,996.32
Net Present Value [$]	$ 9,900.77	$ 9,989.48	$ 10,104.62	$ 10,116.36	$ 9,957.16	$ 10,205.25	$ 10,193.86	$ 10,361.65	$ 15,929.04	$ 10,071.57
Incremental dollars per GHG saving	$ 3.16	$ 3.17	$ 3.2	$ 3.2	$ 3.2	$ 3.21	$ 3.22	$ 3.22	$ 3.22	$ 3.23
Auxiliary Energy Required Heating [GJ/yr]	47.8	47.9	47.4	47.9	47.1	47.9	47.9	47.8	48.1	46.7
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	14.7	16.2	14.7	13.7	16.2	9.3	16.2
Annual Energy Space Heating [GJ/yr]	28.1	28	27.9	28.1	27.7	28	28.1	28.1	28	27.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	73.6	73.6	73.5	72.1	73.3	72.1	71.1	73.6	66.7	73.2
Design Heating Load [W]	8434.2	8466.1	8500.4	8434.2	8351.8	8466.1	8434.2	8434.2	8127.3	8386.1
Annual Energy Electricity [kWh/yr]	15962	15959.9	15932.7	15963.5	15861.6	15961.4	15964.6	15962	18531.3	15834.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,195.31	$ 2,195.01	$ 2,191.16	$ 2,195.52	$ 2,181.1	$ 2,195.22	$ 2,195.68	$ 2,195.31	$ 2,558.86	$ 2,177.21
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	393.7	434.1	393.7	366.8	434.1	0	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$.	$ 187.26
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43771	45499	43573	43772	45715	45500	43773	44419	51658	43789
Upgrade Package List	Pkg3321202053	Pkg3331201053	Pkg3321201054	Pkg3321202053	Pkg3321202053	Pkg3331201053	Pkg3321202053	Pkg3321302053	Pkg4331302054	Pkg3321202054
GHGI [kg/m2]	4.3	4.29	4.29	3.97	4.29	3.97	3.75	4.3	0.87	4.29
% ICC	4.5%	4.5%	4.5%	4.6%	4.5%	4.6%	4.7%	4.6%	5.1%	4.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	56.7	56.7	56.2	56.7	55.8	56.7	56.7	56.7	56.9	55.3
Output: MEUI [kWh/(m2 * yr)]	56.5	56.5	56.4	54.8	56.1	54.7	53.6	56.5	48.3	56
Output: Better than ERS (%)	5340.0%	5340.0%	5350.0%	5440.0%	5360.0%	5440.0%	5500.0%	5340.0%	5820.0%	5370.0%
Output: Better than Envelope (%)	3780.0%	3760.0%	3830.0%	3760.0%	3870.0%	3760.0%	3760.0%	3780.0%	3740.0%	3920.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7487	7485	7458	7489	7387	7486	7490	7487	10056	7359
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,055.68	$ 1,055.38	$ 1,051.55	$ 1,055.89	$ 1,041.52	$ 1,055.6	$ 1,056.05	$ 1,055.68	$ 1,417.95	$ 1,037.65
Annual savings in carbon tax for electricity [$/year]	$ 3.74	$ 3.74	$ 3.73	$ 3.74	$ 3.69	$ 3.74	$ 3.74	$ 3.74	$ 5.03	$ 3.68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,059.42	$ 1,059.13	$ 1,055.28	$ 1,059.64	$ 1,045.22	$ 1,059.34	$ 1,059.79	$ 1,059.42	$ 1,422.98	$ 1,041.33
Annual savings in GHG from electricity savings [kg CO2e/year]	82.4	82.3	82	82.4	81.3	82.4	82.4	82.4	110.6	81
Annual savings in natural gas [m3/year]	146.08	146.08	146.08	147.58	146.08	147.58	148.58	146.08	162.25	146.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,367.35	$ 1,353.41	$ 1,367.35	$ 1,376.64	$ 1,353.41	$ 1,503.26	$ 1,353.41
Annual savings in carbon tax for natural gas [$/year]	$ 337.8	$ 337.8	$ 337.8	$ 341.28	$ 337.8	$ 341.28	$ 343.6	$ 337.8	$ 375.21	$ 337.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,708.64	$ 1,691.21	$ 1,708.64	$ 1,720.24	$ 1,691.21	$ 1,878.47	$ 1,691.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	7506.8	7506.8	7506.8	7584.1	7506.8	7584.1	7635.6	7506.8	8337.9	7506.8
Net Present Value [$]	$ 9,900.77	$ 9,989.48	$ 10,104.62	$ 10,116.36	$ 9,957.16	$ 10,205.25	$ 10,193.86	$ 10,361.65	$ 15,929.04	$ 10,071.57
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	8.78	10.51	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$.	$.

MEDIUM 018WWR Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 23,465.59	$ 23,780.52	$ 23,559.78	$ 24,926.47	$ 23,965.59	$ 25,241.4	$ 23,744.85	$ 24,015.59	$ 24,280.52	$ 24,059.78
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,245.32	$ 35,718.34	$ 35,386.79	$ 37,439.56	$ 35,996.32	$ 37,912.58	$ 35,664.76	$ 36,071.42	$ 36,469.34	$ 36,137.79
Net Present Value [$]	$ 9,900.77	$ 9,957.16	$ 9,989.48	$ 10,031.52	$ 10,071.57	$ 10,073.48	$ 10,104.62	$ 10,116.36	$ 10,125.22	$ 10,150.79
Incremental dollars per GHG saving	$ 3.16	$ 3.2	$ 3.17	$ 3.36	$ 3.23	$ 3.4	$ 3.2	$ 3.2	$ 3.27	$ 3.24
Auxiliary Energy Required Heating [GJ/yr]	47.8	47.1	47.9	44.7	46.7	43.9	47.4	47.9	45.9	46.7
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.7	16.2	16.2
Annual Energy Space Heating [GJ/yr]	28.1	27.7	28	26.2	27.6	25.8	27.9	28.1	27.2	27.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	73.6	73.3	73.6	71.8	73.2	71.4	73.5	72.1	72.8	73.1
Design Heating Load [W]	8434.2	8351.8	8466.1	7872.9	8386.1	7790.5	8500.4	8434.2	8303.7	8418
Annual Energy Electricity [kWh/yr]	15962	15861.6	15959.9	15445.3	15834.1	15339.3	15932.7	15963.5	15732.6	15828.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,195.31	$ 2,181.1	$ 2,195.01	$ 2,122.19	$ 2,177.21	$ 2,107.2	$ 2,191.16	$ 2,195.52	$ 2,162.85	$ 2,176.39
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	434.1	434.1	434.1	393.7	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 187.26
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43771	45715	45499	51061	43789	51637	43573	43772	45733	45517
Upgrade Package List	Pkg3321202053	Pkg3331202053	Pkg3331201053	Pkg4321302053	Pkg3321202054	Pkg4331302053	Pkg3321201054	Pkg3321202053	Pkg3331202054	Pkg3331201054
GHGI [kg/m2]	4.3	4.29	4.29	4.27	4.29	4.27	4.29	3.97	4.28	4.29
% ICC	4.5%	4.5%	4.5%	4.8%	4.6%	4.8%	4.5%	4.6%	4.6%	4.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	56.7	55.8	56.7	53	55.3	52.1	56.2	56.7	54.4	55.3
Output: MEUI [kWh/(m2 * yr)]	56.5	56.1	56.5	54.3	56	53.9	56.4	54.8	55.6	56
Output: Better than ERS (%)	5340.0%	5360.0%	5340.0%	5460.0%	5370.0%	5480.0%	5350.0%	5440.0%	5390.0%	5370.0%
Output: Better than Envelope (%)	3780.0%	3870.0%	3760.0%	4180.0%	3920.0%	4280.0%	3830.0%	3760.0%	4020.0%	3920.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7487	7387	7485	6970	7359	6864	7458	7489	7258	7353
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,055.68	$ 1,041.52	$ 1,055.38	$ 982.83	$ 1,037.65	$ 967.88	$ 1,051.55	$ 1,055.89	$ 1,023.34	$ 1,036.83
Annual savings in carbon tax for electricity [$/year]	$ 3.74	$ 3.69	$ 3.74	$ 3.49	$ 3.68	$ 3.43	$ 3.73	$ 3.74	$ 3.63	$ 3.68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,059.42	$ 1,045.22	$ 1,059.13	$ 986.31	$ 1,041.33	$ 971.31	$ 1,055.28	$ 1,059.64	$ 1,026.96	$ 1,040.51
Annual savings in GHG from electricity savings [kg CO2e/year]	82.4	81.3	82.3	76.7	81	75.5	82	82.4	79.8	80.9
Annual savings in natural gas [m3/year]	146.08	146.08	146.08	146.08	146.08	146.08	146.08	147.58	146.08	146.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,353.41	$ 1,367.35	$ 1,353.41	$ 1,353.41
Annual savings in carbon tax for natural gas [$/year]	$ 337.8	$ 337.8	$ 337.8	$ 337.8	$ 337.8	$ 337.8	$ 337.8	$ 341.28	$ 337.8	$ 337.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,691.21	$ 1,708.64	$ 1,691.21	$ 1,691.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	7506.8	7506.8	7506.8	7506.8	7506.8	7506.8	7506.8	7584.1	7506.8	7506.8
Net Present Value [$]	$ 9,900.77	$ 9,957.16	$ 9,989.48	$ 10,031.52	$ 10,071.57	$ 10,073.48	$ 10,104.62	$ 10,116.36	$ 10,125.22	$ 10,150.79
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	10.51	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 018WWR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,500.59	$ 6,721.33	$ 6,815.52	$ 6,872.89	$ 6,967.08	$ 7,036.26	$ 7,050.59	$ 7,100.59	$ 7,187.82	$ 7,202.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 9,763.89	$ 10,095.44	$ 10,236.91	$ 10,323.08	$ 10,464.55	$ 10,568.46	$ 10,589.99	$ 10,665.09	$ 10,796.11	$ 10,817.63
Net Present Value [$]	$ 10,121.6	$ 10,109.21	$ 10,030.79	$ 9,059.63	$ 8,980.06	$ 10,018.16	$ 9,982.15	$ 11,885.62	$ 8,971.37	$ 8,928.64
Incremental dollars per GHG saving	$ 1.95	$ 1.98	$ 2.01	$ 2.15	$ 2.18	$ 2.05	$ 2.05	$ 1.83	$ 2.22	$ 2.22
Auxiliary Energy Required Heating [GJ/yr]	89.4	88.5	88.5	92.2	92.1	87.6	89.4	89.7	91.3	93
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.4	27.4	27.4	25.6	16.5	27.4	25.5
Annual Energy Space Heating [GJ/yr]	94.7	93.8	93.7	97.6	97.6	92.8	94.7	95	96.7	98.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	148.5	147.6	147.5	151.4	151.3	146.6	146.6	137.9	150.4	150.5
Design Heating Load [W]	13393.6	13273.7	13309.9	13273.7	13309.9	13190	13393.6	12907.3	13190	13393.6
Annual Energy Electricity [kWh/yr]	7810.5	7806.1	7805.8	7825.3	7825.1	7801.4	7810.5	7812.4	7820.5	7829.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,041.87	$ 1,041.25	$ 1,041.21	$ 1,043.96	$ 1,043.94	$ 1,040.58	$ 1,041.87	$ 1,042.14	$ 1,043.29	$ 1,044.62
Annual Energy Natural Gas [m3/yr]	3231.4	3207.9	3206.1	3309.2	3307.5	3182.6	3182.4	2948.6	3283.6	3284.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,393.91	$ 1,383.78	$ 1,383.	$ 1,427.47	$ 1,426.74	$ 1,372.86	$ 1,372.78	$ 1,271.92	$ 1,416.43	$ 1,416.65
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	13069	11665	13015	13339	11450	11452	13285	11396
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121102021	Pkg2131101021	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg2131102021	Pkg2121101021
GHGI [kg/m2]	26.76	26.57	26.56	27.4	27.38	26.36	26.36	24.45	27.19	27.19
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	105.9	104.9	104.9	109.2	109.2	103.9	105.9	106.3	108.1	110.2
Output: MEUI [kWh/(m2 * yr)]	145.6	144.5	144.4	149.1	149	143.4	143.4	133.1	147.9	148
Output: Better than ERS (%)	2190.0%	2240.0%	2240.0%	2040.0%	2040.0%	2290.0%	2290.0%	2450.0%	2090.0%	2080.0%
Output: Better than Envelope (%)	20.0%	80.0%	80.0%	340.0%	330.0%	180.0%	20.0%	60.0%	240.0%	430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	791	796	796	776	776	800	791	789	781	772
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 111.55	$ 112.17	$ 112.21	$ 109.46	$ 109.49	$ 112.83	$ 111.55	$ 111.28	$ 110.14	$ 108.81
Annual savings in carbon tax for electricity [$/year]	$ .4	$ .4	$ .4	$ .39	$ .39	$ .4	$ .4	$ .39	$ .39	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 111.94	$ 112.56	$ 112.61	$ 109.85	$ 109.87	$ 113.23	$ 111.94	$ 111.67	$ 110.53	$ 109.2
Annual savings in GHG from electricity savings [kg CO2e/year]	8.7	8.8	8.8	8.5	8.5	8.8	8.7	8.7	8.6	8.5
Annual savings in natural gas [m3/year]	64.88	65.75	65.82	61.98	62.04	66.7	66.7	75.42	62.93	62.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 601.1	$ 609.22	$ 609.84	$ 574.25	$ 574.83	$ 617.95	$ 618.02	$ 698.73	$ 583.08	$ 582.91
Annual savings in carbon tax for natural gas [$/year]	$ 150.03	$ 152.06	$ 152.21	$ 143.33	$ 143.48	$ 154.24	$ 154.25	$ 174.4	$ 145.53	$ 145.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 751.14	$ 761.27	$ 762.05	$ 717.58	$ 718.31	$ 772.19	$ 772.27	$ 873.13	$ 728.62	$ 728.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	3334.1	3379.1	3382.5	3185.1	3188.3	3427.5	3427.9	3875.5	3234.1	3233.2
Net Present Value [$]	$ 10,121.6	$ 10,109.21	$ 10,030.79	$ 9,059.63	$ 8,980.06	$ 10,018.16	$ 9,982.15	$ 11,885.62	$ 8,971.37	$ 8,928.64
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,717.68	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,717.68
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

MEDIUM 018WWR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,250.59	$ 9,650.59	$ 10,402.15	$ 10,471.33	$ 9,802.15	$ 11,560.26	$ 10,565.52	$ 9,871.33	$ 10,622.89	$ 9,965.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 15,396.39	$ 14,495.19	$ 15,624.03	$ 15,727.94	$ 14,722.83	$ 17,363.51	$ 15,869.41	$ 14,826.74	$ 15,955.58	$ 14,968.21
Net Present Value [$]	$ 11,586.89	$ 13,726.81	$ 12,765.67	$ 11,476.78	$ 14,951.55	$ 18,101.14	$ 11,542.31	$ 13,612.69	$ 12,646.25	$ 13,672.81
Incremental dollars per GHG saving	$ 1.21	$ 1.22	$ 1.22	$ 1.23	$ 1.24	$ 1.24	$ 1.24	$ 1.24	$ 1.25	$ 1.25
Auxiliary Energy Required Heating [GJ/yr]	89.5	89.2	93.2	88.7	92.8	94.7	88.6	88.3	92.3	88.3
Annual Energy DHW [GJ/yr]	16.5	27.4	16.5	16.5	27.4	9.5	16.5	27.4	16.5	27.4
Annual Energy Space Heating [GJ/yr]	58.3	58.7	60	57.8	60.3	61.4	57.8	58.2	59.5	58.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	102.4	113.7	103.8	101.9	115.2	98.4	101.9	113.2	103.3	113.2
Design Heating Load [W]	13012.9	13500.7	13012.9	12893	13500.7	13297.1	12929.2	13380.8	12893	13417
Annual Energy Electricity [kWh/yr]	23859.8	23970.5	24258.8	23731.3	24388.3	27321.5	23720.2	23840.4	24126.7	23828.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,312.85	$ 3,328.51	$ 3,369.31	$ 3,294.66	$ 3,387.63	$ 3,802.68	$ 3,293.09	$ 3,310.1	$ 3,350.61	$ 3,308.42
Annual Energy Natural Gas [m3/yr]	442.6	735.7	442.6	442.6	735.4	0	442.6	735.7	442.6	735.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 317.36	$ 190.92	$ 190.92	$ 317.23	$.	$ 190.92	$ 317.36	$ 190.92	$ 317.18
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11458	11407	11731	11404	13354	13081	11728	11677	13078
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121101021	Pkg2121102031	Pkg2121101021	Pkg2131102031	Pkg2131101031	Pkg2121102031	Pkg2121102021	Pkg2131101031
GHGI [kg/m2]	4.74	7.13	4.75	4.73	7.15	1.28	4.73	7.13	4.75	7.12
% ICC	2.0%	1.8%	2.0%	2.0%	1.9%	2.2%	2.0%	1.9%	2.0%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	106.1	105.7	110.5	105.1	110	112.3	105	104.7	109.4	104.7
Output: MEUI [kWh/(m2 * yr)]	90.8	104.2	92.5	90.2	106	86	90.2	103.6	92	103.6
Output: Better than ERS (%)	4210.0%	3840.0%	4140.0%	4240.0%	3760.0%	4500.0%	4240.0%	3860.0%	4160.0%	3860.0%
Output: Better than Envelope (%)	30.0%	0.0%	450.0%	60.0%	400.0%	620.0%	70.0%	100.0%	350.0%	100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15258	15369	15657	15130	15787	18720	15119	15239	15525	15227
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,151.41	$ 2,167.01	$ 2,207.67	$ 2,133.29	$ 2,225.92	$ 2,639.51	$ 2,131.72	$ 2,148.67	$ 2,189.04	$ 2,146.99
Annual savings in carbon tax for electricity [$/year]	$ 7.63	$ 7.68	$ 7.83	$ 7.56	$ 7.89	$ 9.36	$ 7.56	$ 7.62	$ 7.76	$ 7.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,159.04	$ 2,174.7	$ 2,215.49	$ 2,140.85	$ 2,233.82	$ 2,648.87	$ 2,139.28	$ 2,156.29	$ 2,196.8	$ 2,154.61
Annual savings in GHG from electricity savings [kg CO2e/year]	167.8	169.1	172.2	166.4	173.7	205.9	166.3	167.6	170.8	167.5
Annual savings in natural gas [m3/year]	168.79	157.87	168.79	168.79	157.88	185.28	168.79	157.87	168.79	157.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,563.81	$ 1,462.63	$ 1,563.81	$ 1,563.81	$ 1,462.73	$ 1,716.6	$ 1,563.81	$ 1,462.63	$ 1,563.81	$ 1,462.77
Annual savings in carbon tax for natural gas [$/year]	$ 390.32	$ 365.07	$ 390.32	$ 390.32	$ 365.09	$ 428.45	$ 390.32	$ 365.07	$ 390.32	$ 365.1
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,954.13	$ 1,827.69	$ 1,954.13	$ 1,954.13	$ 1,827.82	$ 2,145.05	$ 1,954.13	$ 1,827.69	$ 1,954.13	$ 1,827.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	8673.8	8112.6	8673.8	8673.8	8113.1	9521.2	8673.8	8112.6	8673.8	8113.3
Net Present Value [$]	$ 11,586.89	$ 13,726.81	$ 12,765.67	$ 11,476.78	$ 14,951.55	$ 18,101.14	$ 11,542.31	$ 13,612.69	$ 12,646.25	$ 13,672.81
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,566.12	$ 1,717.68	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,717.68	$ 1,566.12
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6	$ 3,149.6
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$ 1,374.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 018WWR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 8,563.63	$ 8,784.37	$ 8,878.56	$ 9,099.3	$ 7,100.59	$ 7,321.33	$ 9,113.63	$ 9,334.37	$ 7,415.52	$ 9,413.63
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 12,862.57	$ 13,194.12	$ 13,335.6	$ 13,667.15	$ 10,665.09	$ 10,996.64	$ 13,688.67	$ 14,020.22	$ 11,138.11	$ 14,139.27
Net Present Value [$]	$ 12,054.43	$ 12,042.76	$ 11,958.34	$ 11,946.62	$ 11,885.62	$ 11,873.9	$ 11,851.77	$ 11,840.23	$ 11,791.17	$ 11,782.59
Incremental dollars per GHG saving	$ 2.02	$ 2.05	$ 2.07	$ 2.1	$ 1.83	$ 1.86	$ 2.11	$ 2.14	$ 1.89	$ 2.15
Auxiliary Energy Required Heating [GJ/yr]	83.1	82.3	82.2	81.4	89.7	88.9	83.1	82.3	88.8	83.2
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	16.5	16.5	14.9	14.9	16.5	13.9
Annual Energy Space Heating [GJ/yr]	88	87.2	87.1	86.2	95	94.1	88.1	87.2	94.1	88.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	130.9	130.1	130	129.1	137.9	137	129.4	128.5	137	128.4
Design Heating Load [W]	12256	12136.1	12172.3	12052.4	12907.3	12787.4	12256	12136.1	12823.6	12256
Annual Energy Electricity [kWh/yr]	7777.5	7773.1	7772.9	7768.4	7812.4	7807.9	7777.6	7773.1	7807.7	7777.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,037.2	$ 1,036.58	$ 1,036.55	$ 1,035.91	$ 1,042.14	$ 1,041.5	$ 1,037.22	$ 1,036.58	$ 1,041.47	$ 1,037.23
Annual Energy Natural Gas [m3/yr]	2764.5	2740.9	2739.8	2716.2	2948.6	2925	2723	2699.4	2923.7	2695.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,192.51	$ 1,182.33	$ 1,181.85	$ 1,171.67	$ 1,271.92	$ 1,261.74	$ 1,174.61	$ 1,164.43	$ 1,261.18	$ 1,162.7
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17824	18094	20956	21226	11452	11722	17825	18095	13072	17826
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2221102031	Pkg2131101031	Pkg2221101031
GHGI [kg/m2]	22.95	22.75	22.74	22.55	24.45	24.26	22.61	22.41	24.25	22.38
% ICC	1.6%	1.7%	1.7%	1.7%	1.4%	1.4%	1.7%	1.8%	1.4%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	98.5	97.5	97.5	96.5	106.3	105.3	98.5	97.5	105.3	98.5
Output: MEUI [kWh/(m2 * yr)]	124.8	123.8	123.7	122.6	133.1	132	123	121.9	132	121.8
Output: Better than ERS (%)	2830.0%	2880.0%	2880.0%	2930.0%	2450.0%	2500.0%	2910.0%	2960.0%	2500.0%	2970.0%
Output: Better than Envelope (%)	680.0%	770.0%	780.0%	870.0%	60.0%	30.0%	680.0%	770.0%	40.0%	670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	824	828	829	833	789	794	824	828	794	824
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 116.2	$ 116.82	$ 116.85	$ 117.48	$ 111.28	$ 111.91	$ 116.18	$ 116.82	$ 111.94	$ 116.17
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .42	$ .39	$ .4	$ .41	$ .41	$ .4	$ .41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 116.61	$ 117.23	$ 117.26	$ 117.9	$ 111.67	$ 112.31	$ 116.6	$ 117.23	$ 112.34	$ 116.58
Annual savings in GHG from electricity savings [kg CO2e/year]	9.1	9.1	9.1	9.2	8.7	8.7	9.1	9.1	8.7	9.1
Annual savings in natural gas [m3/year]	82.28	83.15	83.2	84.07	75.42	76.3	83.82	84.7	76.34	84.85
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 762.28	$ 770.43	$ 770.81	$ 778.95	$ 698.73	$ 706.87	$ 776.61	$ 784.75	$ 707.32	$ 786.13
Annual savings in carbon tax for natural gas [$/year]	$ 190.26	$ 192.29	$ 192.39	$ 194.42	$ 174.4	$ 176.43	$ 193.84	$ 195.87	$ 176.54	$ 196.22
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 952.54	$ 962.72	$ 963.2	$ 973.38	$ 873.13	$ 883.31	$ 970.44	$ 980.62	$ 883.87	$ 982.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	4228	4273.2	4275.3	4320.5	3875.5	3920.7	4307.5	4352.7	3923.2	4360.3
Net Present Value [$]	$ 12,054.43	$ 12,042.76	$ 11,958.34	$ 11,946.62	$ 11,885.62	$ 11,873.9	$ 11,851.77	$ 11,840.23	$ 11,791.17	$ 11,782.59
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 3,149.6	$ 3,149.6	$ 4,612.64	$ 4,612.64	$ 3,149.6	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.

MEDIUM 018WWR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,870.34	$ 15,091.08	$ 15,185.27	$ 15,287.83	$ 15,331.22	$ 15,345.7	$ 15,370.34	$ 15,405.7	$ 15,406.01	$ 15,420.34
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,335.25	$ 22,666.8	$ 22,808.28	$ 22,962.32	$ 23,027.49	$ 23,049.24	$ 23,086.25	$ 23,139.36	$ 23,139.83	$ 23,161.35
Net Present Value [$]	$ 12,533.74	$ 12,418.15	$ 12,491.79	$ 13,312.93	$ 12,994.62	$ 13,569.69	$ 12,726.92	$ 12,275.58	$ 12,372.06	$ 12,673.18
Incremental dollars per GHG saving	$ 1.87	$ 1.89	$ 1.91	$ 1.92	$ 1.92	$ 1.93	$ 1.93	$ 1.93	$ 1.93	$ 1.91
Auxiliary Energy Required Heating [GJ/yr]	73	72.1	72.1	73.7	73	73.6	71.8	71.2	71.3	73
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	25.6
Annual Energy Space Heating [GJ/yr]	48.6	48.1	48.1	49.1	48.6	49.4	48.2	47.5	47.6	48.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	104.7	104.3	104.2	105.2	104.7	105.5	104.3	103.6	103.8	102.9
Design Heating Load [W]	10903.2	10783.3	10819.5	10948.3	10903.2	11240.9	10852.7	10691	10699.6	10903.2
Annual Energy Electricity [kWh/yr]	21478.2	21347.3	21340.9	21618.7	21478.2	21695	21357.7	21169.7	21208.3	21478.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,975.85	$ 2,957.33	$ 2,956.42	$ 2,995.73	$ 2,975.85	$ 3,006.53	$ 2,958.8	$ 2,932.2	$ 2,937.66	$ 2,975.85
Annual Energy Natural Gas [m3/yr]	736.1	736.2	735.7	736.1	736.1	736.4	736.5	736.2	735.8	687.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 317.53	$ 317.57	$ 317.36	$ 317.53	$ 317.53	$ 317.66	$ 317.7	$ 317.57	$ 317.4	$ 296.39
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35668	35884	37612	36082	36316	27892	35686	43426	37828	35669
Upgrade Package List	Pkg3221201033	Pkg3221202033	Pkg3231201033	Pkg3221203032	Pkg3221301033	Pkg2321201033	Pkg3221201034	Pkg3321201032	Pkg3231202033	Pkg3221201033
GHGI [kg/m2]	7.02	7.02	7.01	7.03	7.02	7.03	7.02	7.01	7.01	6.62
% ICC	2.8%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	86.5	85.5	85.5	87.4	86.5	87.2	85.1	84.4	84.5	86.5
Output: MEUI [kWh/(m2 * yr)]	93.5	93	92.9	94.1	93.5	94.5	93.1	92.2	92.4	91.4
Output: Better than ERS (%)	4330.0%	4350.0%	4350.0%	4300.0%	4330.0%	4280.0%	4350.0%	4380.0%	4370.0%	4420.0%
Output: Better than Envelope (%)	1820.0%	1920.0%	1920.0%	1740.0%	1820.0%	1750.0%	1950.0%	2020.0%	2010.0%	1820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12877	12746	12739	13017	12877	13093	12756	12568	12607	12877
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,815.6	$ 1,797.14	$ 1,796.24	$ 1,835.41	$ 1,815.6	$ 1,846.17	$ 1,798.61	$ 1,772.1	$ 1,777.54	$ 1,815.6
Annual savings in carbon tax for electricity [$/year]	$ 6.44	$ 6.37	$ 6.37	$ 6.51	$ 6.44	$ 6.55	$ 6.38	$ 6.28	$ 6.3	$ 6.44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,822.04	$ 1,803.52	$ 1,802.61	$ 1,841.92	$ 1,822.04	$ 1,852.72	$ 1,804.99	$ 1,778.39	$ 1,783.85	$ 1,822.04
Annual savings in GHG from electricity savings [kg CO2e/year]	141.6	140.2	140.1	143.2	141.6	144	140.3	138.2	138.7	141.6
Annual savings in natural gas [m3/year]	157.85	157.85	157.87	157.85	157.85	157.84	157.84	157.85	157.86	159.68
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,462.49	$ 1,462.46	$ 1,462.63	$ 1,462.49	$ 1,462.49	$ 1,462.39	$ 1,462.35	$ 1,462.46	$ 1,462.59	$ 1,479.41
Annual savings in carbon tax for natural gas [$/year]	$ 365.03	$ 365.02	$ 365.07	$ 365.03	$ 365.03	$ 365.	$ 365.	$ 365.02	$ 365.06	$ 369.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,827.52	$ 1,827.48	$ 1,827.69	$ 1,827.52	$ 1,827.52	$ 1,827.39	$ 1,827.35	$ 1,827.48	$ 1,827.65	$ 1,848.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	8111.8	8111.6	8112.6	8111.8	8111.8	8111.2	8111	8111.6	8112.4	8205.6
Net Present Value [$]	$ 12,533.74	$ 12,418.15	$ 12,491.79	$ 13,312.93	$ 12,994.62	$ 13,569.69	$ 12,726.92	$ 12,275.58	$ 12,372.06	$ 12,673.18
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	14.09	8.78	8.78	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	7.04	5.28	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 5,588.	$ 4,612.64	$ 5,588.	$ 4,612.64	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM 018WWR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,470.34	$ 15,691.08	$ 15,785.27	$ 16,020.34	$ 14,870.34	$ 15,931.22	$ 15,945.7	$ 15,970.34	$ 16,005.7	$ 16,006.01
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,236.45	$ 23,568.	$ 23,709.48	$ 24,062.55	$ 22,335.25	$ 23,928.69	$ 23,950.44	$ 23,987.45	$ 24,040.56	$ 24,041.03
Net Present Value [$]	$ 10,330.71	$ 10,219.88	$ 10,363.55	$ 10,534.77	$ 12,533.74	$ 10,791.59	$ 11,388.7	$ 10,588.79	$ 10,087.71	$ 10,252.71
Incremental dollars per GHG saving	$ 1.81	$ 1.84	$ 1.85	$ 1.86	$ 1.87	$ 1.87	$ 1.87	$ 1.87	$ 1.88	$ 1.88
Auxiliary Energy Required Heating [GJ/yr]	73.3	72.5	72.5	73.4	73	73.3	73.8	72.2	71.6	71.6
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	27.4	16.5	16.5	16.5	16.5	16.5
Annual Energy Space Heating [GJ/yr]	48.2	47.7	47.7	48.2	48.6	48.2	48.9	47.8	47.1	47.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	93.3	92.9	92.9	91.8	104.7	93.3	94.1	93	92.2	92.5
Design Heating Load [W]	10434.3	10314.4	10350.6	10434.3	10903.2	10434.3	10753.1	10383.8	10222	10230.7
Annual Energy Electricity [kWh/yr]	21344.4	21215.6	21234.8	21346.3	21478.2	21344.4	21570.7	21250.4	21042	21106
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,956.92	$ 2,938.69	$ 2,941.41	$ 2,957.19	$ 2,975.85	$ 2,956.92	$ 2,988.94	$ 2,943.62	$ 2,914.13	$ 2,923.18
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	400.7	736.1	442.6	442.6	442.6	442.6	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 317.53	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35671	35887	37615	35672	35668	36319	27895	35689	43429	37831
Upgrade Package List	Pkg3221201033	Pkg3221202033	Pkg3221201033	Pkg3221201033	Pkg3221201033	Pkg3221301033	Pkg3221201033	Pkg3221201034	Pkg3321201032	Pkg3231202033
GHGI [kg/m2]	4.62	4.61	4.61	4.27	7.02	4.62	4.63	4.61	4.6	4.61
% ICC	3.0%	3.0%	3.0%	3.1%	2.8%	3.0%	3.1%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	86.9	85.9	85.9	86.9	86.5	86.9	87.5	85.5	84.8	84.9
Output: MEUI [kWh/(m2 * yr)]	80	79.5	79.6	78.2	93.5	80	81	79.6	78.7	79
Output: Better than ERS (%)	4730.0%	4750.0%	4750.0%	4810.0%	4330.0%	4730.0%	4680.0%	4750.0%	4790.0%	4770.0%
Output: Better than Envelope (%)	1780.0%	1870.0%	1870.0%	1770.0%	1820.0%	1780.0%	1730.0%	1910.0%	1970.0%	1970.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12743	12614	12633	12745	12877	12743	12969	12649	12440	12504
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,796.73	$ 1,778.57	$ 1,781.28	$ 1,797.	$ 1,815.6	$ 1,796.73	$ 1,828.64	$ 1,783.48	$ 1,754.1	$ 1,763.12
Annual savings in carbon tax for electricity [$/year]	$ 6.37	$ 6.31	$ 6.32	$ 6.37	$ 6.44	$ 6.37	$ 6.48	$ 6.32	$ 6.22	$ 6.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,803.11	$ 1,784.88	$ 1,787.6	$ 1,803.38	$ 1,822.04	$ 1,803.11	$ 1,835.13	$ 1,789.81	$ 1,760.32	$ 1,769.37
Annual savings in GHG from electricity savings [kg CO2e/year]	140.2	138.8	139	140.2	141.6	140.2	142.7	139.1	136.8	137.5
Annual savings in natural gas [m3/year]	168.79	168.79	168.79	170.35	157.85	168.79	168.79	168.79	168.79	168.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,578.27	$ 1,462.49	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,563.81
Annual savings in carbon tax for natural gas [$/year]	$ 390.32	$ 390.32	$ 390.32	$ 393.93	$ 365.03	$ 390.32	$ 390.32	$ 390.32	$ 390.32	$ 390.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,972.2	$ 1,827.52	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,954.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	8673.8	8673.8	8673.8	8754	8111.8	8673.8	8673.8	8673.8	8673.8	8673.8
Net Present Value [$]	$ 10,330.71	$ 10,219.88	$ 10,363.55	$ 10,534.77	$ 12,533.74	$ 10,791.59	$ 11,388.7	$ 10,588.79	$ 10,087.71	$ 10,252.71
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	7.04	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 4,612.64	$ 5,588.	$ 4,612.64	$ 5,588.	$ 4,612.64
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.	$.

MEDIUM 018WWR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 15,827.32	$ 15,842.25	$ 15,792.25	$ 16,142.25	$ 16,027.32	$ 15,929.	$ 16,327.32	$ 16,342.25	$ 16,123.6	$ 16,164.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,772.63	$ 23,795.06	$ 23,719.96	$ 24,245.66	$ 24,073.03	$ 23,925.36	$ 24,523.63	$ 24,546.06	$ 24,217.65	$ 24,278.43
Net Present Value [$]	$ 9,380.36	$ 9,347.39	$ 9,331.62	$ 9,278.2	$ 9,233.12	$ 9,184.13	$ 9,164.18	$ 9,129.09	$ 9,084.08	$ 9,083.75
Incremental dollars per GHG saving	$ 2.95	$ 2.95	$ 2.95	$ 2.98	$ 2.98	$ 2.98	$ 3.	$ 3.01	$ 3.	$ 3.
Auxiliary Energy Required Heating [GJ/yr]	64.3	63.4	62.3	63.5	63.2	62.3	63.2	62.3	64.3	63.2
Annual Energy DHW [GJ/yr]	13.9	14.9	16.5	13.9	14.9	16.5	13.9	14.9	13.9	14.9
Annual Energy Space Heating [GJ/yr]	68.1	67.2	66	67.2	66.9	66	66.9	66	68.1	67
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	109.3	109.5	109.8	108.4	109.1	109.8	108.1	108.2	109.3	109.2
Design Heating Load [W]	9161.8	9078.1	9027.6	9078.1	9111.3	9007.5	9111.3	9027.6	9161.8	9091.2
Annual Energy Electricity [kWh/yr]	7931.6	7926.9	7920.9	7927	7925.4	7921.1	7925.5	7920.9	7931.6	7925.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,059.01	$ 1,058.34	$ 1,057.49	$ 1,058.36	$ 1,058.13	$ 1,057.52	$ 1,058.14	$ 1,057.49	$ 1,059.01	$ 1,058.17
Annual Energy Natural Gas [m3/yr]	2169.2	2172.8	2182.5	2145.2	2164.8	2183.7	2137.2	2141	2169.2	2166.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 935.72	$ 937.27	$ 941.45	$ 925.36	$ 933.82	$ 941.97	$ 921.91	$ 923.55	$ 935.72	$ 934.42
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	50982	51557	51574	51558	50999	51700	51000	51575	51270	51125
Upgrade Package List	Pkg4321302033	Pkg4331302033	Pkg4331302034	Pkg4331302033	Pkg4321302034	Pkg4331303033	Pkg4321302034	Pkg4331302034	Pkg4321402033	Pkg4321303033
GHGI [kg/m2]	18.09	18.12	18.2	17.9	18.06	18.21	17.83	17.86	18.09	18.07
% ICC	3.0%	3.0%	3.0%	3.1%	3.1%	3.0%	3.1%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	76.2	75.2	73.8	75.2	74.8	73.9	74.9	73.8	76.2	74.9
Output: MEUI [kWh/(m2 * yr)]	99.2	99.3	99.7	98.1	99	99.8	97.8	97.9	99.2	99
Output: Better than ERS (%)	4010.0%	4000.0%	3990.0%	4060.0%	4030.0%	3990.0%	4080.0%	4070.0%	4010.0%	4020.0%
Output: Better than Envelope (%)	2790.0%	2890.0%	3020.0%	2880.0%	2910.0%	3020.0%	2910.0%	3020.0%	2790.0%	2910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	670	675	681	675	676	680	676	681	670	676
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 94.47	$ 95.13	$ 95.98	$ 95.12	$ 95.34	$ 95.95	$ 95.33	$ 95.98	$ 94.47	$ 95.3
Annual savings in carbon tax for electricity [$/year]	$ .34	$ .34	$ .34	$ .34	$ .34	$ .34	$ .34	$ .34	$ .34	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 94.8	$ 95.47	$ 96.32	$ 95.46	$ 95.68	$ 96.29	$ 95.67	$ 96.32	$ 94.8	$ 95.64
Annual savings in GHG from electricity savings [kg CO2e/year]	7.4	7.4	7.5	7.4	7.4	7.5	7.4	7.5	7.4	7.4
Annual savings in natural gas [m3/year]	104.46	104.32	103.96	105.35	104.62	103.92	105.65	105.51	104.46	104.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 967.78	$ 966.54	$ 963.19	$ 976.06	$ 969.3	$ 962.77	$ 978.83	$ 977.51	$ 967.78	$ 968.81
Annual savings in carbon tax for natural gas [$/year]	$ 241.55	$ 241.24	$ 240.41	$ 243.62	$ 241.93	$ 240.3	$ 244.31	$ 243.98	$ 241.55	$ 241.81
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,209.33	$ 1,207.78	$ 1,203.6	$ 1,219.68	$ 1,211.23	$ 1,203.08	$ 1,223.14	$ 1,221.5	$ 1,209.33	$ 1,210.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	5367.8	5361	5342.4	5413.8	5376.3	5340.1	5429.1	5421.8	5367.8	5373.6
Net Present Value [$]	$ 9,380.36	$ 9,347.39	$ 9,331.62	$ 9,278.2	$ 9,233.12	$ 9,184.13	$ 9,164.18	$ 9,129.09	$ 9,084.08	$ 9,083.75
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	10.51	14.09	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12	$ 1,566.12
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.

MEDIUM 018WWR Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85
Total increase in construction cost [$]	$ 24,326.47	$ 24,622.75	$ 24,641.4	$ 24,826.47	$ 24,867.27	$ 24,876.47	$ 24,926.47	$ 24,937.68	$ 24,963.22	$ 25,122.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,538.36	$ 36,983.37	$ 37,011.38	$ 37,289.36	$ 37,350.64	$ 37,439.56	$ 37,439.56	$ 37,456.4	$ 37,494.76	$ 37,734.37
Net Present Value [$]	$ 13,334.59	$ 13,630.87	$ 13,262.82	$ 13,498.32	$ 14,429.67	$ 13,474.03	$ 11,364.38	$ 13,559.1	$ 13,505.75	$ 13,794.6
Incremental dollars per GHG saving	$ 3.04	$ 3.08	$ 3.08	$ 3.1	$ 3.07	$ 3.07	$ 2.91	$ 3.11	$ 3.12	$ 3.14
Auxiliary Energy Required Heating [GJ/yr]	53.5	53.5	52.7	52.4	54.7	53.5	54.1	52.7	52.4	52.4
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.5	25.6	25.6	16.5	27.4	27.4	27.5
Annual Energy Space Heating [GJ/yr]	36.5	36.5	35.9	36	37.8	36.5	36.3	35.9	35.8	36
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	92.6	92.6	92.1	92.2	92.2	90.8	81.5	92.1	92	92.2
Design Heating Load [W]	8673.4	8673.4	8589.7	8623	9128.8	8673.4	8253.1	8589.7	8602.9	8623
Annual Energy Electricity [kWh/yr]	18114.2	18114.2	17965.7	17982.4	18488.6	18114.2	18072.8	17965.7	17933.1	17982.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,499.84	$ 2,499.84	$ 2,478.83	$ 2,481.19	$ 2,552.82	$ 2,499.84	$ 2,493.99	$ 2,478.83	$ 2,474.22	$ 2,481.19
Annual Energy Natural Gas [m3/yr]	736.7	736.7	736.2	737.1	687.8	687.7	442.6	736.2	736.8	737.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 317.79	$ 317.79	$ 317.57	$ 317.96	$ 296.69	$ 296.65	$ 190.92	$ 317.57	$ 317.83	$ 317.96
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51058	51346	51634	51076	45947	51059	51061	51922	51202	51364
Upgrade Package List	Pkg4321302053	Pkg4321402053	Pkg4331302053	Pkg4321302054	Pkg3331203054	Pkg4321302053	Pkg4321302053	Pkg4331402053	Pkg4321303053	Pkg4321402054
GHGI [kg/m2]	6.87	6.87	6.86	6.86	6.49	6.47	4.46	6.86	6.86	6.86
% ICC	4.7%	4.7%	4.7%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	63.4	63.4	62.4	62.1	64.8	63.4	64.1	62.4	62.1	62.1
Output: MEUI [kWh/(m2 * yr)]	79.2	79.2	78.6	78.7	78.7	77.1	66.1	78.6	78.5	78.7
Output: Better than ERS (%)	4980.0%	4980.0%	5010.0%	5000.0%	5000.0%	5080.0%	5400.0%	5010.0%	5010.0%	5000.0%
Output: Better than Envelope (%)	4000.0%	4000.0%	4090.0%	4130.0%	3870.0%	4000.0%	3930.0%	4090.0%	4130.0%	4130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9513	9513	9364	9381	9887	9513	9471	9364	9332	9381
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,341.28	$ 1,341.28	$ 1,320.34	$ 1,322.69	$ 1,394.07	$ 1,341.28	$ 1,335.44	$ 1,320.34	$ 1,315.74	$ 1,322.69
Annual savings in carbon tax for electricity [$/year]	$ 4.76	$ 4.76	$ 4.68	$ 4.69	$ 4.94	$ 4.76	$ 4.74	$ 4.68	$ 4.67	$ 4.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,346.03	$ 1,346.03	$ 1,325.02	$ 1,327.38	$ 1,399.01	$ 1,346.03	$ 1,340.17	$ 1,325.02	$ 1,320.41	$ 1,327.38
Annual savings in GHG from electricity savings [kg CO2e/year]	104.6	104.6	103	103.2	108.8	104.6	104.2	103	102.6	103.2
Annual savings in natural gas [m3/year]	157.83	157.83	157.85	157.81	159.65	159.65	168.79	157.85	157.83	157.81
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,462.28	$ 1,462.28	$ 1,462.46	$ 1,462.15	$ 1,479.16	$ 1,479.2	$ 1,563.81	$ 1,462.46	$ 1,462.25	$ 1,462.15
Annual savings in carbon tax for natural gas [$/year]	$ 364.98	$ 364.98	$ 365.02	$ 364.94	$ 369.19	$ 369.2	$ 390.32	$ 365.02	$ 364.97	$ 364.94
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,827.26	$ 1,827.26	$ 1,827.48	$ 1,827.09	$ 1,848.36	$ 1,848.4	$ 1,954.13	$ 1,827.48	$ 1,827.22	$ 1,827.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	8110.6	8110.6	8111.6	8109.9	8204.3	8204.5	8673.8	8111.6	8110.5	8109.9
Net Present Value [$]	$ 13,334.59	$ 13,630.87	$ 13,262.82	$ 13,498.32	$ 14,429.67	$ 13,474.03	$ 11,364.38	$ 13,559.1	$ 13,505.75	$ 13,794.6
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	14.09	10.51	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$.

MEDIUM 018WWR Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,926.47	$ 25,222.75	$ 25,241.4	$ 25,476.47	$ 25,776.47	$ 25,426.47	$ 25,537.68	$ 25,772.75	$ 25,791.4	$ 25,563.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,439.56	$ 37,884.57	$ 37,912.58	$ 38,265.66	$ 38,716.26	$ 38,190.56	$ 38,357.6	$ 38,710.67	$ 38,738.68	$ 38,395.96
Net Present Value [$]	$ 11,364.38	$ 11,660.66	$ 11,295.88	$ 11,568.62	$ 11,638.97	$ 11,558.55	$ 11,592.16	$ 11,864.9	$ 11,499.76	$ 11,567.12
Incremental dollars per GHG saving	$ 2.91	$ 2.94	$ 2.95	$ 2.95	$ 2.96	$ 2.97	$ 2.98	$ 2.98	$ 2.98	$ 2.98
Auxiliary Energy Required Heating [GJ/yr]	54.1	54.1	53.3	54.1	54.1	53	53.3	54.1	53.3	53
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	13.9	16.5	16.5	14.9	14.9	16.5
Annual Energy Space Heating [GJ/yr]	36.3	36.3	35.8	36.3	36.3	35.9	35.8	36.3	35.8	35.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	81.5	81.5	81	80	79	81.1	81	80	79.5	80.9
Design Heating Load [W]	8253.1	8253.1	8169.4	8253.1	8253.1	8202.6	8169.4	8253.1	8169.4	8182.5
Annual Energy Electricity [kWh/yr]	18072.8	18072.8	17923.9	18074.8	18076.1	17954	17923.9	18074.8	17925.7	17904.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,493.99	$ 2,493.99	$ 2,472.92	$ 2,494.27	$ 2,494.45	$ 2,477.18	$ 2,472.92	$ 2,494.27	$ 2,473.17	$ 2,470.13
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	400.7	372.9	442.6	442.6	400.7	400.7	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 160.86	$ 190.92	$ 190.92	$ 172.85	$ 172.85	$ 190.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51061	51349	51637	51062	51063	51079	51925	51350	51638	51205
Upgrade Package List	Pkg4321302053	Pkg4321402053	Pkg4331302053	Pkg4321302053	Pkg4321302053	Pkg4321302054	Pkg4331402053	Pkg4321402053	Pkg4331302053	Pkg4321303053
GHGI [kg/m2]	4.46	4.46	4.46	4.12	3.89	4.46	4.46	4.12	4.11	4.46
% ICC	4.8%	4.8%	4.8%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.1	64.1	63.2	64.2	64.2	62.8	63.2	64.2	63.2	62.9
Output: MEUI [kWh/(m2 * yr)]	66.1	66.1	65.4	64.2	63	65.6	65.4	64.2	63.6	65.3
Output: Better than ERS (%)	5400.0%	5400.0%	5420.0%	5480.0%	5540.0%	5420.0%	5420.0%	5480.0%	5510.0%	5430.0%
Output: Better than Envelope (%)	3930.0%	3930.0%	4020.0%	3930.0%	3930.0%	4060.0%	4020.0%	3930.0%	4020.0%	4060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9471	9471	9322	9473	9474	9352	9322	9473	9324	9303
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,335.44	$ 1,335.44	$ 1,314.44	$ 1,335.72	$ 1,335.9	$ 1,318.69	$ 1,314.44	$ 1,335.72	$ 1,314.7	$ 1,311.67
Annual savings in carbon tax for electricity [$/year]	$ 4.74	$ 4.74	$ 4.66	$ 4.74	$ 4.74	$ 4.68	$ 4.66	$ 4.74	$ 4.66	$ 4.65
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,340.17	$ 1,340.17	$ 1,319.11	$ 1,340.46	$ 1,340.64	$ 1,323.36	$ 1,319.11	$ 1,340.46	$ 1,319.36	$ 1,316.32
Annual savings in GHG from electricity savings [kg CO2e/year]	104.2	104.2	102.5	104.2	104.2	102.9	102.5	104.2	102.6	102.3
Annual savings in natural gas [m3/year]	168.79	168.79	168.79	170.35	171.38	168.79	168.79	170.35	170.35	168.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,578.27	$ 1,587.87	$ 1,563.81	$ 1,563.81	$ 1,578.27	$ 1,578.27	$ 1,563.81
Annual savings in carbon tax for natural gas [$/year]	$ 390.32	$ 390.32	$ 390.32	$ 393.93	$ 396.32	$ 390.32	$ 390.32	$ 393.93	$ 393.93	$ 390.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,972.2	$ 1,984.19	$ 1,954.13	$ 1,954.13	$ 1,972.2	$ 1,972.2	$ 1,954.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	8673.8	8673.8	8673.8	8754	8807.2	8673.8	8673.8	8754	8754	8673.8
Net Present Value [$]	$ 11,364.38	$ 11,660.66	$ 11,295.88	$ 11,568.62	$ 11,638.97	$ 11,558.55	$ 11,592.16	$ 11,864.9	$ 11,499.76	$ 11,567.12
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.	$.

MEDIUM 018WWR Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k	medium 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,241.4	$ 24,926.47	$ 25,741.4	$ 25,878.15	$ 25,791.4	$ 25,426.47	$ 25,563.22	$ 25,476.47	$ 26,091.4	$ 25,537.68
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,912.58	$ 37,439.56	$ 38,663.58	$ 38,868.98	$ 38,738.68	$ 38,190.56	$ 38,395.96	$ 38,265.66	$ 39,189.28	$ 38,357.6
Net Present Value [$]	$ 11,295.88	$ 11,364.38	$ 11,487.31	$ 11,491.69	$ 11,499.76	$ 11,558.55	$ 11,567.12	$ 11,568.62	$ 11,570.11	$ 11,592.16
Incremental dollars per GHG saving	$ 2.95	$ 2.91	$ 3.	$ 3.02	$ 2.98	$ 2.97	$ 2.98	$ 2.95	$ 3.	$ 2.98
Auxiliary Energy Required Heating [GJ/yr]	53.3	54.1	52.2	52.2	53.3	53	53	54.1	53.3	53.3
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	16.5	14.9	13.9	16.5
Annual Energy Space Heating [GJ/yr]	35.8	36.3	35.4	35.2	35.8	35.9	35.7	36.3	35.8	35.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	81	81.5	80.6	80.4	79.5	81.1	80.9	80	78.4	81
Design Heating Load [W]	8169.4	8253.1	8118.9	8098.8	8169.4	8202.6	8182.5	8253.1	8169.4	8169.4
Annual Energy Electricity [kWh/yr]	17923.9	18072.8	17804	17752.6	17925.7	17954	17904.2	18074.8	17927	17923.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,472.92	$ 2,493.99	$ 2,455.95	$ 2,448.68	$ 2,473.17	$ 2,477.18	$ 2,470.13	$ 2,494.27	$ 2,473.36	$ 2,472.92
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	400.7	442.6	442.6	400.7	372.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 190.92	$ 172.85	$ 160.86	$ 190.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51637	51061	51655	51781	51638	51079	51205	51062	51639	51925
Upgrade Package List	Pkg4331302053	Pkg4321302053	Pkg4331302054	Pkg4331303053	Pkg4331302053	Pkg4321302054	Pkg4321303053	Pkg4321302053	Pkg4331302053	Pkg4331402053
GHGI [kg/m2]	4.46	4.46	4.45	4.45	4.11	4.46	4.46	4.12	3.89	4.46
% ICC	4.8%	4.8%	4.9%	5.0%	4.9%	4.9%	4.9%	4.9%	5.0%	4.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	63.2	64.1	61.8	61.9	63.2	62.8	62.9	64.2	63.2	63.2
Output: MEUI [kWh/(m2 * yr)]	65.4	66.1	64.9	64.7	63.6	65.6	65.3	64.2	62.4	65.4
Output: Better than ERS (%)	5420.0%	5400.0%	5450.0%	5460.0%	5510.0%	5420.0%	5430.0%	5480.0%	5570.0%	5420.0%
Output: Better than Envelope (%)	4020.0%	3930.0%	4150.0%	4150.0%	4020.0%	4060.0%	4060.0%	3930.0%	4020.0%	4020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9322	9471	9202	9151	9324	9352	9303	9473	9325	9322
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,314.44	$ 1,335.44	$ 1,297.54	$ 1,290.29	$ 1,314.7	$ 1,318.69	$ 1,311.67	$ 1,335.72	$ 1,314.88	$ 1,314.44
Annual savings in carbon tax for electricity [$/year]	$ 4.66	$ 4.74	$ 4.6	$ 4.58	$ 4.66	$ 4.68	$ 4.65	$ 4.74	$ 4.66	$ 4.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,319.11	$ 1,340.17	$ 1,302.14	$ 1,294.87	$ 1,319.36	$ 1,323.36	$ 1,316.32	$ 1,340.46	$ 1,319.54	$ 1,319.11
Annual savings in GHG from electricity savings [kg CO2e/year]	102.5	104.2	101.2	100.7	102.6	102.9	102.3	104.2	102.6	102.5
Annual savings in natural gas [m3/year]	168.79	168.79	168.79	168.79	170.35	168.79	168.79	170.35	171.38	168.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,563.81	$ 1,578.27	$ 1,563.81	$ 1,563.81	$ 1,578.27	$ 1,587.87	$ 1,563.81
Annual savings in carbon tax for natural gas [$/year]	$ 390.32	$ 390.32	$ 390.32	$ 390.32	$ 393.93	$ 390.32	$ 390.32	$ 393.93	$ 396.32	$ 390.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,954.13	$ 1,972.2	$ 1,954.13	$ 1,954.13	$ 1,972.2	$ 1,984.19	$ 1,954.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	8673.8	8673.8	8673.8	8673.8	8754	8673.8	8673.8	8754	8807.2	8673.8
Net Present Value [$]	$ 11,295.88	$ 11,364.38	$ 11,487.31	$ 11,491.69	$ 11,499.76	$ 11,558.55	$ 11,567.12	$ 11,568.62	$ 11,570.11	$ 11,592.16
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	14.09	10.51	10.51	14.09	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27	$ 8,365.27
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.	$ 5,588.
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

MEDIUM 023WWR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,902.22	$ 7,103.82	$ 7,122.96	$ 7,217.15	$ 7,324.56	$ 7,369.02	$ 7,402.22	$ 7,418.75	$ 7,437.89	$ 7,452.22
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,902.22	$ 7,103.82	$ 7,122.96	$ 7,217.15	$ 7,324.56	$ 7,369.02	$ 7,402.22	$ 7,418.75	$ 7,437.89	$ 7,452.22
Net Present Value [$]	$ 578.25	$ 304.95	$ 433.59	$ 354.63	$ 446.81	$ 4,682.7	$ 576.19	$ 524.86	$ 209.	$ 270.04
Incremental dollars per GHG saving	$ 4.9	$ 5.63	$ 5.	$ 5.05	$ 5.73	$ 3.52	$ 4.88	$ 5.79	$ 5.15	$ 5.09
Auxiliary Energy Required Heating [GJ/yr]	23.3	26	23	22.9	25.7	30.1	21.3	25.6	22.6	23.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	23.7	13.5	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	24.7	27.6	24.3	24.3	27.2	10.6	22.5	27.2	23.9	24.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	64.5	67.4	64.2	64.1	67.1	61.6	62.4	67	63.8	63.4
Design Heating Load [W]	6347.7	6347.7	6293.3	6301.5	6293.3	7121	5972.8	6301.5	6247.2	6347.7
Annual Energy Electricity [kWh/yr]	7448.2	7462.8	7446.6	7446.3	7461.1	10537	7437.6	7460.7	7444.7	7448.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 990.61	$ 992.67	$ 990.38	$ 990.34	$ 992.43	$ 1,427.67	$ 989.11	$ 992.37	$ 990.11	$ 990.62
Annual Energy Natural Gas [m3/yr]	1012.2	1089.1	1003.6	1001.9	1080.2	635.2	956	1078.4	993.4	983.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 436.63	$ 469.8	$ 432.92	$ 432.18	$ 465.96	$ 274.	$ 412.39	$ 465.18	$ 428.52	$ 424.16
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	54436	54382	54706	56056	54652	54334	64156	56002	56326	54437
Upgrade Package List	Pkg1121101031	Pkg1121101021	Pkg1121102031	Pkg1131101031	Pkg1121102021	Pkg1121101011	Pkg2121101031	Pkg1131101021	Pkg1131102031	Pkg1121101031
GHGI [kg/m2]	8.62	9.25	8.55	8.53	9.17	5.68	8.16	9.16	8.46	8.38
% ICC	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	27.6	30.8	27.2	27.1	30.5	35.7	25.2	30.4	26.8	27.6
Output: MEUI [kWh/(m2 * yr)]	46.1	49.5	45.7	45.6	49.1	42.6	43.6	49.1	45.2	44.8
Output: Better than ERS (%)	1600.0%	1220.0%	1640.0%	1650.0%	1260.0%	2610.0%	1870.0%	1280.0%	1690.0%	1740.0%
Output: Better than Envelope (%)	830.0%	240.0%	940.0%	980.0%	120.0%	1850.0%	1610.0%	80.0%	1100.0%	830.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	522	508	524	524	510	2566	533	510	526	522
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 73.66	$ 71.6	$ 73.88	$ 73.93	$ 71.84	$ 361.86	$ 75.15	$ 71.9	$ 74.15	$ 73.64
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .25	$ .26	$ .26	$ .25	$ 1.28	$ .27	$ .25	$ .26	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 73.92	$ 71.85	$ 74.15	$ 74.19	$ 72.09	$ 363.15	$ 75.42	$ 72.15	$ 74.41	$ 73.91
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.6	5.8	5.8	5.6	28.2	5.9	5.6	5.8	5.7
Annual savings in natural gas [m3/year]	27.29	24.43	27.61	27.68	24.76	41.34	29.39	24.83	27.99	28.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 252.86	$ 226.32	$ 255.83	$ 256.42	$ 229.39	$ 383.	$ 272.26	$ 230.01	$ 259.35	$ 262.84
Annual savings in carbon tax for natural gas [$/year]	$ 63.11	$ 56.49	$ 63.85	$ 64.	$ 57.25	$ 95.6	$ 67.96	$ 57.41	$ 64.73	$ 65.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 315.97	$ 282.8	$ 319.68	$ 320.42	$ 286.64	$ 478.6	$ 340.22	$ 287.42	$ 324.08	$ 328.44
Annual savings in GHG from natural gas savings [kg CO2e/year]	1402.5	1255.3	1419	1422.2	1272.3	2124.4	1510.1	1275.8	1438.5	1457.8
Net Present Value [$]	$ 578.25	$ 304.95	$ 433.59	$ 354.63	$ 446.81	$ 4,682.7	$ 576.19	$ 524.86	$ 209.	$ 270.04
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,083.2	$ 2,284.8	$.	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$ 3,150.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM 023WWR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USi1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 8,469.02	$ 10,826.22	$ 10,826.72	$ 8,689.76	$ 10,920.91	$ 8,783.95	$ 11,027.82	$ 11,046.96	$ 9,019.02	$ 11,141.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 8,469.02	$ 10,826.22	$ 10,826.72	$ 8,689.76	$ 10,920.91	$ 8,783.95	$ 11,027.82	$ 11,046.96	$ 9,019.02	$ 11,141.15
Net Present Value [$]	$ 3,446.65	$ 7,686.14	$ 8,504.26	$ 3,595.08	$ 8,566.68	$ 3,670.65	$ 8,406.83	$ 7,837.14	$ 3,755.04	$ 7,885.31
Incremental dollars per GHG saving	$ 3.23	$ 3.29	$ 3.29	$ 3.32	$ 3.32	$ 3.35	$ 3.35	$ 3.36	$ 3.37	$ 3.38
Auxiliary Energy Required Heating [GJ/yr]	30.1	26.2	30.8	29.8	30.7	29.7	29.2	25.9	30.2	25.9
Annual Energy DHW [GJ/yr]	13.5	7.8	7.8	13.5	7.8	13.5	7.8	7.8	12.4	7.8
Annual Energy Space Heating [GJ/yr]	10.5	9.3	10.7	10.4	10.7	10.4	10.2	9.2	10.5	9.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	51.4	44.7	45.9	51.3	45.8	51.2	45.5	44.6	50.3	44.6
Design Heating Load [W]	6619.5	6518.9	6414.6	6565.2	6422.7	6573.4	6518.9	6464.6	6619.5	6472.7
Annual Energy Electricity [kWh/yr]	10518.2	12427.5	12745.1	10490.1	12732.7	10482.9	12629.1	12400.4	10519	12382.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,425.01	$ 1,695.18	$ 1,740.12	$ 1,421.03	$ 1,738.36	$ 1,420.02	$ 1,723.7	$ 1,691.34	$ 1,425.12	$ 1,688.81
Annual Energy Natural Gas [m3/yr]	362.1	0	0	362.1	0	362.1	0	0	333	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$.	$.	$ 156.2	$.	$ 156.2	$.	$.	$ 143.64	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64057	54448	70702	64327	73564	65677	54394	54718	64058	56068
Upgrade Package List	Pkg2121101011	Pkg1121101031	Pkg2221102011	Pkg2121102011	Pkg2231101011	Pkg2131101011	Pkg1121101021	Pkg1122102031	Pkg2121101011	Pkg1131101031
GHGI [kg/m2]	3.45	0.58	0.6	3.45	0.6	3.45	0.59	0.58	3.21	0.58
% ICC	1.6%	2.1%	2.1%	1.7%	2.1%	1.7%	2.1%	2.1%	1.7%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	35.7	31.1	36.4	35.3	36.4	35.3	34.6	30.7	35.7	30.7
Output: MEUI [kWh/(m2 * yr)]	30.4	22.5	23.9	30.3	23.9	30.3	23.4	22.4	29.1	22.3
Output: Better than ERS (%)	3380.0%	4230.0%	4080.0%	3400.0%	4090.0%	3410.0%	4130.0%	4250.0%	3530.0%	4250.0%
Output: Better than Envelope (%)	1850.0%	310.0%	2130.0%	1730.0%	2090.0%	1690.0%	1500.0%	200.0%	1890.0%	200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2548	4457	4774	2520	4762	2512	4658	4430	2548	4412
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 359.21	$ 628.42	$ 673.2	$ 355.25	$ 671.46	$ 354.23	$ 656.85	$ 624.6	$ 359.32	$ 622.08
Annual savings in carbon tax for electricity [$/year]	$ 1.27	$ 2.23	$ 2.39	$ 1.26	$ 2.38	$ 1.26	$ 2.33	$ 2.21	$ 1.27	$ 2.21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 360.49	$ 630.65	$ 675.59	$ 356.51	$ 673.84	$ 355.49	$ 659.18	$ 626.82	$ 360.6	$ 624.28
Annual savings in GHG from electricity savings [kg CO2e/year]	28	49	52.5	27.7	52.4	27.6	51.2	48.7	28	48.5
Annual savings in natural gas [m3/year]	51.51	65.01	65.01	51.51	65.01	51.51	65.01	65.01	52.6	65.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 477.28	$ 602.28	$ 602.28	$ 477.28	$ 602.28	$ 477.28	$ 602.28	$ 602.28	$ 487.32	$ 602.28
Annual savings in carbon tax for natural gas [$/year]	$ 119.13	$ 150.33	$ 150.33	$ 119.13	$ 150.33	$ 119.13	$ 150.33	$ 150.33	$ 121.63	$ 150.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 596.41	$ 752.6	$ 752.6	$ 596.41	$ 752.6	$ 596.41	$ 752.6	$ 752.6	$ 608.96	$ 752.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	2647.3	3340.6	3340.6	2647.3	3340.6	2647.3	3340.6	3340.6	2703	3340.6
Net Present Value [$]	$ 3,446.65	$ 7,686.14	$ 8,504.26	$ 3,595.08	$ 8,566.68	$ 3,670.65	$ 8,406.83	$ 7,837.14	$ 3,755.04	$ 7,885.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	USi1 40 SHGC0 35	NA	NA	NA	NA	USi1 40 SHGC0 25	USi1 40 SHGC0 35	NA	USi1 40 SHGC0 35
Window Cost of Upgrade	$.	$ 2,083.2	$.	$.	$.	$.	$ 2,284.8	$ 2,083.2	$.	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	5.28	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 023WWR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,902.22	$ 7,402.22	$ 7,122.96	$ 7,622.96	$ 7,217.15	$ 7,717.15	$ 7,452.22	$ 7,952.22	$ 7,437.89	$ 7,937.89
ICC with multiplier (Van=1.0,this Cz =1)	$ 6,902.22	$ 7,402.22	$ 7,122.96	$ 7,622.96	$ 7,217.15	$ 7,717.15	$ 7,452.22	$ 7,952.22	$ 7,437.89	$ 7,937.89
Net Present Value [$]	$ 578.25	$ 576.19	$ 433.59	$ 430.98	$ 354.63	$ 350.87	$ 270.04	$ 268.35	$ 209.	$ 205.61
Incremental dollars per GHG saving	$ 4.9	$ 4.88	$ 5.	$ 4.98	$ 5.05	$ 5.03	$ 5.09	$ 5.06	$ 5.15	$ 5.12
Auxiliary Energy Required Heating [GJ/yr]	23.3	21.3	23	21	22.9	20.9	23.3	21.3	22.6	20.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	24.7	22.5	24.3	22.2	24.3	22.1	24.7	22.5	23.9	21.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	64.5	62.4	64.2	62.1	64.1	62	63.4	61.3	63.8	61.7
Design Heating Load [W]	6347.7	5972.8	6293.3	5918.4	6301.5	5926.6	6347.7	5972.8	6247.2	5872.3
Annual Energy Electricity [kWh/yr]	7448.2	7437.6	7446.6	7436	7446.3	7435.7	7448.3	7437.6	7444.7	7434
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 990.61	$ 989.11	$ 990.38	$ 988.88	$ 990.34	$ 988.84	$ 990.62	$ 989.11	$ 990.11	$ 988.6
Annual Energy Natural Gas [m3/yr]	1012.2	956	1003.6	947.5	1001.9	945.9	983.3	927.1	993.4	937.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 436.63	$ 412.39	$ 432.92	$ 408.72	$ 432.18	$ 408.03	$ 424.16	$ 399.92	$ 428.52	$ 404.36
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	54436	64156	54706	64426	56056	65776	54437	64157	56326	66046
Upgrade Package List	Pkg1121101031	Pkg2121101031	Pkg1121102031	Pkg2121102031	Pkg1131101031	Pkg2131101031	Pkg1121101031	Pkg2121101031	Pkg1131102031	Pkg2131102031
GHGI [kg/m2]	8.62	8.16	8.55	8.09	8.53	8.08	8.38	7.92	8.46	8.01
% ICC	1.3%	1.4%	1.4%	1.5%	1.4%	1.5%	1.4%	1.5%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	27.6	25.2	27.2	24.8	27.1	24.8	27.6	25.2	26.8	24.4
Output: MEUI [kWh/(m2 * yr)]	46.1	43.6	45.7	43.2	45.6	43.1	44.8	42.3	45.2	42.7
Output: Better than ERS (%)	1600.0%	1870.0%	1640.0%	1910.0%	1650.0%	1930.0%	1740.0%	2020.0%	1690.0%	1970.0%
Output: Better than Envelope (%)	830.0%	1610.0%	940.0%	1730.0%	980.0%	1770.0%	830.0%	1610.0%	1100.0%	1890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	522	533	524	535	524	535	522	533	526	537
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 73.66	$ 75.15	$ 73.88	$ 75.38	$ 73.93	$ 75.42	$ 73.64	$ 75.15	$ 74.15	$ 75.66
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .27	$ .26	$ .27	$ .26	$ .27	$ .26	$ .27	$ .26	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 73.92	$ 75.42	$ 74.15	$ 75.65	$ 74.19	$ 75.69	$ 73.91	$ 75.42	$ 74.41	$ 75.93
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.9	5.8	5.9	5.8	5.9	5.7	5.9	5.8	5.9
Annual savings in natural gas [m3/year]	27.29	29.39	27.61	29.7	27.68	29.76	28.37	30.46	27.99	30.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 252.86	$ 272.26	$ 255.83	$ 275.2	$ 256.42	$ 275.75	$ 262.84	$ 282.24	$ 259.35	$ 278.68
Annual savings in carbon tax for natural gas [$/year]	$ 63.11	$ 67.96	$ 63.85	$ 68.69	$ 64.	$ 68.83	$ 65.6	$ 70.45	$ 64.73	$ 69.56
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 315.97	$ 340.22	$ 319.68	$ 343.88	$ 320.42	$ 344.57	$ 328.44	$ 352.68	$ 324.08	$ 348.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	1402.5	1510.1	1419	1526.4	1422.2	1529.5	1457.8	1565.5	1438.5	1545.7
Net Present Value [$]	$ 578.25	$ 576.19	$ 433.59	$ 430.98	$ 354.63	$ 350.87	$ 270.04	$ 268.35	$ 209.	$ 205.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.

MEDIUM 023WWR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USi1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,315.18	$ 9,535.92	$ 9,539.18	$ 9,615.18	$ 9,630.11	$ 9,759.92	$ 9,835.92	$ 9,850.85	$ 9,854.11	$ 9,930.11
ICC with multiplier (Van=1.0,this Cz =1)	$ 9,315.18	$ 9,535.92	$ 9,539.18	$ 9,615.18	$ 9,630.11	$ 9,759.92	$ 9,835.92	$ 9,850.85	$ 9,854.11	$ 9,930.11
Net Present Value [$]	$ 572.65	$ 718.03	$ 4,322.67	$ 716.87	$ 798.94	$ 4,467.33	$ 862.25	$ 945.29	$ 4,546.95	$ 943.16
Incremental dollars per GHG saving	$ 5.53	$ 5.61	$ 4.46	$ 5.59	$ 5.65	$ 4.52	$ 5.67	$ 5.73	$ 4.56	$ 5.71
Auxiliary Energy Required Heating [GJ/yr]	19.2	18.9	22.1	19.2	18.8	21.8	18.9	18.5	21.7	18.8
Annual Energy DHW [GJ/yr]	12.4	12.4	7.8	11.7	12.4	7.8	11.7	12.4	7.8	11.7
Annual Energy Space Heating [GJ/yr]	20.3	20	23.4	20.3	19.9	23.1	20	19.6	23	19.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	59.1	58.7	57.6	58.4	58.7	57.3	58.1	58.4	57.2	58
Design Heating Load [W]	5700.5	5646.2	5820.9	5700.5	5654.4	5766.5	5646.2	5600	5774.7	5654.4
Annual Energy Electricity [kWh/yr]	7426.5	7424.9	9612.8	7426.5	7424.6	9611.5	7424.9	7423	9610.1	7424.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 987.53	$ 987.31	$ 1,296.9	$ 987.53	$ 987.27	$ 1,296.71	$ 987.31	$ 987.04	$ 1,296.51	$ 987.27
Annual Energy Natural Gas [m3/yr]	868.2	859.7	617.2	849.6	858.2	608.5	841.1	849.8	607.2	839.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 374.51	$ 370.84	$ 266.24	$ 366.49	$ 370.2	$ 262.49	$ 362.82	$ 366.57	$ 261.92	$ 362.17
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70529	70799	70531	70530	73661	70801	70800	73931	73663	73662
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2231101031
GHGI [kg/m2]	7.44	7.37	5.49	7.29	7.36	5.42	7.22	7.29	5.41	7.21
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.7	22.3	26.2	22.7	22.3	25.8	22.4	21.9	25.8	22.3
Output: MEUI [kWh/(m2 * yr)]	39.6	39.3	37.9	38.8	39.2	37.5	38.4	38.8	37.4	38.4
Output: Better than ERS (%)	2300.0%	2360.0%	2490.0%	2400.0%	2360.0%	2530.0%	2430.0%	2400.0%	2540.0%	2450.0%
Output: Better than Envelope (%)	2440.0%	2560.0%	1300.0%	2440.0%	2600.0%	1420.0%	2560.0%	2720.0%	1460.0%	2600.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	544	546	1642	544	546	1641	546	548	1640	546
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 76.72	$ 76.94	$ 231.55	$ 76.72	$ 76.99	$ 231.37	$ 76.94	$ 77.21	$ 231.17	$ 76.99
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .27	$ .82	$ .27	$ .27	$ .82	$ .27	$ .27	$ .82	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 76.99	$ 77.22	$ 232.37	$ 76.99	$ 77.26	$ 232.19	$ 77.22	$ 77.49	$ 231.99	$ 77.26
Annual savings in GHG from electricity savings [kg CO2e/year]	6	6	18.1	6	6	18	6	6	18	6
Annual savings in natural gas [m3/year]	32.66	32.97	42.01	33.35	33.03	42.33	33.67	33.34	42.38	33.72
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 302.57	$ 305.51	$ 389.22	$ 308.99	$ 306.02	$ 392.22	$ 311.93	$ 308.92	$ 392.67	$ 312.44
Annual savings in carbon tax for natural gas [$/year]	$ 75.52	$ 76.25	$ 97.15	$ 77.12	$ 76.38	$ 97.9	$ 77.86	$ 77.11	$ 98.01	$ 77.98
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 378.09	$ 381.76	$ 486.36	$ 386.11	$ 382.41	$ 490.12	$ 389.78	$ 386.03	$ 490.68	$ 390.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1678.2	1694.5	2158.8	1713.8	1697.4	2175.5	1730.1	1713.5	2178	1733
Net Present Value [$]	$ 572.65	$ 718.03	$ 4,322.67	$ 716.87	$ 798.94	$ 4,467.33	$ 862.25	$ 945.29	$ 4,546.95	$ 943.16
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35	USi1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.

MEDIUM 023WWR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,689.18	$ 12,909.92	$ 13,004.11	$ 13,126.22	$ 13,224.85	$ 13,239.18	$ 10,552.22	$ 13,221.89	$ 13,346.96	$ 13,459.92
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,689.18	$ 12,909.92	$ 13,004.11	$ 13,126.22	$ 13,224.85	$ 13,239.18	$ 10,552.22	$ 13,221.89	$ 13,346.96	$ 13,459.92
Net Present Value [$]	$ 8,559.86	$ 8,726.92	$ 8,766.15	$ 9,695.83	$ 8,928.1	$ 8,637.33	$ 3,635.16	$ 9,883.89	$ 9,848.29	$ 8,803.29
Incremental dollars per GHG saving	$ 3.85	$ 3.92	$ 3.95	$ 3.99	$ 4.01	$ 4.02	$ 4.02	$ 4.02	$ 4.05	$ 4.08
Auxiliary Energy Required Heating [GJ/yr]	22	21.7	21.7	21.9	21.4	21.8	21.2	22.3	21.6	21.5
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.8	7.8	7.3	13.5	7.8	7.8	7.3
Annual Energy Space Heating [GJ/yr]	7.8	7.8	7.7	7.8	7.6	7.7	7.5	8	7.7	7.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	1.7	0.7	0.7	0.7	1.7	1.7	0.7
Total Energy [GJ/yr]	43.4	43.3	43.2	44.3	43.1	42.7	48.7	44.5	44.2	42.6
Design Heating Load [W]	5866.8	5812.5	5820.6	5613	5766.3	5866.8	6017.5	5619.3	5558.7	5812.5
Annual Energy Electricity [kWh/yr]	12043.2	12022.4	12001	12314.7	11978.2	11859.7	9782.2	12350.6	12288.2	11838.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,640.8	$ 1,637.85	$ 1,634.83	$ 1,679.22	$ 1,631.6	$ 1,614.83	$ 1,320.87	$ 1,684.29	$ 1,675.47	$ 1,611.82
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	362.1	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$ 156.2	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70540	70810	73672	64204	73942	70541	64165	66076	64474	70811
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2121101033	Pkg2231102031	Pkg2221101031	Pkg2121101031	Pkg2131102032	Pkg2121102033	Pkg2221102031
GHGI [kg/m2]	0.57	0.56	0.56	0.58	0.56	0.56	3.42	0.58	0.58	0.56
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.0%	2.5%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.1	25.7	25.7	26	25.3	25.9	25.1	26.5	25.6	25.5
Output: MEUI [kWh/(m2 * yr)]	20.9	20.8	20.7	22	20.6	20.1	27.2	22.2	21.9	20
Output: Better than ERS (%)	4400.0%	4410.0%	4430.0%	4280.0%	4440.0%	4490.0%	3730.0%	4260.0%	4300.0%	4500.0%
Output: Better than Envelope (%)	1340.0%	1460.0%	1460.0%	1380.0%	1570.0%	1420.0%	1650.0%	1220.0%	1500.0%	1540.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4073	4052	4030	4344	4008	3889	1812	4380	4318	3868
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 574.24	$ 571.3	$ 568.29	$ 612.52	$ 565.07	$ 548.36	$ 255.44	$ 617.58	$ 608.78	$ 545.36
Annual savings in carbon tax for electricity [$/year]	$ 2.04	$ 2.03	$ 2.02	$ 2.17	$ 2.	$ 1.94	$ .91	$ 2.19	$ 2.16	$ 1.93
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 576.27	$ 573.33	$ 570.3	$ 614.69	$ 567.08	$ 550.31	$ 256.34	$ 619.77	$ 610.94	$ 547.29
Annual savings in GHG from electricity savings [kg CO2e/year]	44.8	44.6	44.3	47.8	44.1	42.8	19.9	48.2	47.5	42.5
Annual savings in natural gas [m3/year]	65.01	65.01	65.01	65.01	65.01	65.01	51.51	65.01	65.01	65.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 602.28	$ 602.28	$ 602.28	$ 602.28	$ 602.28	$ 602.28	$ 477.28	$ 602.28	$ 602.28	$ 602.28
Annual savings in carbon tax for natural gas [$/year]	$ 150.33	$ 150.33	$ 150.33	$ 150.33	$ 150.33	$ 150.33	$ 119.13	$ 150.33	$ 150.33	$ 150.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 752.6	$ 752.6	$ 752.6	$ 752.6	$ 752.6	$ 752.6	$ 596.41	$ 752.6	$ 752.6	$ 752.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	3340.6	3340.6	3340.6	3340.6	3340.6	3340.6	2647.3	3340.6	3340.6	3340.6
Net Present Value [$]	$ 8,559.86	$ 8,726.92	$ 8,766.15	$ 9,695.83	$ 8,928.1	$ 8,637.33	$ 3,635.16	$ 9,883.89	$ 9,848.29	$ 8,803.29
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	NA	NA	NA	HRV sre 60	HRV sre 75	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$.	$.	$.	$ 1,360.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.

MEDIUM 023WWR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,315.18	$ 9,615.18	$ 9,535.92	$ 9,630.11	$ 9,835.92	$ 9,930.11	$ 9,850.85	$ 10,150.85	$ 10,052.22	$ 10,272.96
ICC with multiplier (Van=1.0,this Cz =1)	$ 9,315.18	$ 9,615.18	$ 9,535.92	$ 9,630.11	$ 9,835.92	$ 9,930.11	$ 9,850.85	$ 10,150.85	$ 10,052.22	$ 10,272.96
Net Present Value [$]	$ 572.65	$ 716.87	$ 718.03	$ 798.94	$ 862.25	$ 943.16	$ 945.29	$ 1,089.51	$ 1,819.8	$ 1,965.97
Incremental dollars per GHG saving	$ 5.53	$ 5.59	$ 5.61	$ 5.65	$ 5.67	$ 5.71	$ 5.73	$ 5.78	$ 5.84	$ 5.91
Auxiliary Energy Required Heating [GJ/yr]	19.2	19.2	18.9	18.8	18.9	18.8	18.5	18.5	19.1	18.8
Annual Energy DHW [GJ/yr]	12.4	11.7	12.4	12.4	11.7	11.7	12.4	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	20.3	20.3	20	19.9	20	19.9	19.6	19.6	20.2	19.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7	1.7
Total Energy [GJ/yr]	59.1	58.4	58.7	58.7	58.1	58	58.4	57.7	59.3	58.9
Design Heating Load [W]	5700.5	5700.5	5646.2	5654.4	5646.2	5654.4	5600	5600	5446.8	5392.4
Annual Energy Electricity [kWh/yr]	7426.5	7426.5	7424.9	7424.6	7424.9	7424.6	7423	7423	7692.3	7690.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 987.53	$ 987.53	$ 987.31	$ 987.27	$ 987.31	$ 987.27	$ 987.04	$ 987.04	$ 1,025.15	$ 1,024.92
Annual Energy Natural Gas [m3/yr]	868.2	849.6	859.7	858.2	841.1	839.6	849.8	831.2	847.4	839
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 374.51	$ 366.49	$ 370.84	$ 370.2	$ 362.82	$ 362.17	$ 366.57	$ 358.55	$ 365.54	$ 361.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70529	70530	70799	73661	70800	73662	73931	73932	64194	64464
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2231102031	Pkg2121101033	Pkg2121102033
GHGI [kg/m2]	7.44	7.29	7.37	7.21	7.22	7.29	7.36	7.14	7.28	7.21
% ICC	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	2.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.7	22.7	22.3	22.3	22.4	22.3	21.9	21.9	22.6	22.3
Output: MEUI [kWh/(m2 * yr)]	39.6	38.8	39.3	39.2	38.4	38.4	38.8	38	39.9	39.5
Output: Better than ERS (%)	2300.0%	2400.0%	2360.0%	2360.0%	2430.0%	2450.0%	2400.0%	2490.0%	2280.0%	2330.0%
Output: Better than Envelope (%)	2440.0%	2440.0%	2560.0%	2600.0%	2560.0%	2600.0%	2720.0%	2720.0%	2480.0%	2600.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	544	544	546	546	546	546	548	548	278	280
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 76.72	$ 76.72	$ 76.94	$ 76.99	$ 76.94	$ 76.99	$ 77.21	$ 77.21	$ 39.24	$ 39.47
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .14	$ .14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 76.99	$ 76.99	$ 77.22	$ 77.26	$ 77.22	$ 77.26	$ 77.49	$ 77.49	$ 39.38	$ 39.61
Annual savings in GHG from electricity savings [kg CO2e/year]	6	6	6	6	6	6	6	6	3.1	3.1
Annual savings in natural gas [m3/year]	32.66	33.35	32.97	33.03	33.67	33.72	33.34	34.04	33.43	33.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 302.57	$ 308.99	$ 305.51	$ 306.02	$ 311.93	$ 312.44	$ 308.92	$ 315.34	$ 309.75	$ 312.65
Annual savings in carbon tax for natural gas [$/year]	$ 75.52	$ 77.12	$ 76.25	$ 76.38	$ 77.86	$ 77.98	$ 77.11	$ 78.71	$ 77.31	$ 78.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 378.09	$ 386.11	$ 381.76	$ 382.41	$ 389.78	$ 390.43	$ 386.03	$ 394.05	$ 387.06	$ 390.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	1678.2	1713.8	1694.5	1697.4	1730.1	1733	1713.5	1749.1	1718.1	1734.1
Net Present Value [$]	$ 572.65	$ 716.87	$ 718.03	$ 798.94	$ 862.25	$ 943.16	$ 945.29	$ 1,089.51	$ 1,819.8	$ 1,965.97
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.

MEDIUM 023WWR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,171.89	$ 16,207.56	$ 16,361.27	$ 16,392.63	$ 16,455.46	$ 16,486.82	$ 16,529.38	$ 16,580.53	$ 16,632.77	$ 16,668.44
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,171.89	$ 16,207.56	$ 16,361.27	$ 16,392.63	$ 16,455.46	$ 16,486.82	$ 16,529.38	$ 16,580.53	$ 16,632.77	$ 16,668.44
Net Present Value [$]	$ 8,529.24	$ 8,617.49	$ 8,755.5	$ 8,727.7	$ 8,817.92	$ 8,775.52	$ 8,967.07	$ 8,775.01	$ 8,990.12	$ 9,078.37
Incremental dollars per GHG saving	$ 6.15	$ 6.16	$ 6.22	$ 6.23	$ 6.26	$ 6.27	$ 6.29	$ 6.3	$ 6.32	$ 6.34
Auxiliary Energy Required Heating [GJ/yr]	15.4	15.4	15.3	15.1	15.3	15	15.3	14.6	15.4	15.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	5.5	5.6	5.6	5.5	5.5	5.4	5.6	5.3	5.5	5.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.7	47.8	47.7	47.7	47.7	47.6	47.8	47.5	47.7	47.8
Design Heating Load [W]	5008.2	4930.6	4896.3	4953.9	4904.5	4962.1	4944.8	4843.9	5008.2	4930.6
Annual Energy Electricity [kWh/yr]	9500.4	9520.8	9514.7	9491.7	9502.4	9473.7	9531.6	9437.1	9500.4	9520.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,280.99	$ 1,283.88	$ 1,283.02	$ 1,279.76	$ 1,281.27	$ 1,277.21	$ 1,285.41	$ 1,272.03	$ 1,280.99	$ 1,283.88
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	88393	90535	96349	88609	98077	90337	88807	96151	89041	91183
Upgrade Package List	Pkg3221201034	Pkg3231202033	Pkg3221202032	Pkg3221202034	Pkg3331201032	Pkg3231201034	Pkg3221203033	Pkg3321201033	Pkg3221301034	Pkg3231302033
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.4	3.4	3.41	3.4	3.4	3.4
% ICC	3.1%	3.1%	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.2	18.2	18.2	17.9	18.1	17.8	18.2	17.4	18.2	18.2
Output: MEUI [kWh/(m2 * yr)]	26	26.1	26.1	26	26	25.9	26.1	25.7	26	26.1
Output: Better than ERS (%)	3860.0%	3850.0%	3860.0%	3860.0%	3860.0%	3870.0%	3850.0%	3890.0%	3860.0%	3850.0%
Output: Better than Envelope (%)	3940.0%	3940.0%	3980.0%	4060.0%	3980.0%	4090.0%	3980.0%	4250.0%	3940.0%	3940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1530	1550	1544	1521	1532	1503	1561	1466	1530	1550
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 215.7	$ 218.58	$ 217.72	$ 214.48	$ 215.98	$ 211.94	$ 220.1	$ 206.78	$ 215.7	$ 218.58
Annual savings in carbon tax for electricity [$/year]	$ .76	$ .78	$ .77	$ .76	$ .77	$ .75	$ .78	$ .73	$ .76	$ .78
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 216.47	$ 219.35	$ 218.49	$ 215.24	$ 216.75	$ 212.69	$ 220.88	$ 207.51	$ 216.47	$ 219.35
Annual savings in GHG from electricity savings [kg CO2e/year]	16.8	17.1	17	16.7	16.8	16.5	17.2	16.1	16.8	17.1
Annual savings in natural gas [m3/year]	51.51	51.51	51.51	51.51	51.51	51.51	51.51	51.51	51.51	51.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28
Annual savings in carbon tax for natural gas [$/year]	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41
Annual savings in GHG from natural gas savings [kg CO2e/year]	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3
Net Present Value [$]	$ 8,529.24	$ 8,617.49	$ 8,755.5	$ 8,727.7	$ 8,817.92	$ 8,775.52	$ 8,967.07	$ 8,775.01	$ 8,990.12	$ 9,078.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	8.78	8.78	14.09	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR80	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 1,163.13	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	7.04	5.28	5.28	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 023WWR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 19,851.08	$ 19,876.95	$ 20,147.36	$ 20,172.9	$ 16,171.89	$ 20,319.34	$ 20,337.83	$ 16,207.56	$ 20,386.15	$ 20,401.08
ICC with multiplier (Van=1.0,this Cz =1)	$ 19,851.08	$ 19,876.95	$ 20,147.36	$ 20,172.9	$ 16,171.89	$ 20,319.34	$ 20,337.83	$ 16,207.56	$ 20,386.15	$ 20,401.08
Net Present Value [$]	$ 14,754.24	$ 14,186.16	$ 15,050.52	$ 15,101.44	$ 8,529.24	$ 14,859.7	$ 14,647.04	$ 8,617.49	$ 14,637.66	$ 14,859.1
Incremental dollars per GHG saving	$ 6.02	$ 6.02	$ 6.11	$ 6.11	$ 6.15	$ 6.16	$ 6.16	$ 6.16	$ 6.17	$ 6.18
Auxiliary Energy Required Heating [GJ/yr]	15.3	15.3	15.3	15.2	15.4	15.2	15.3	15.4	15.3	15.1
Annual Energy DHW [GJ/yr]	7.8	6.9	7.8	7.8	13.5	7.3	6.9	13.5	6.9	7.3
Annual Energy Space Heating [GJ/yr]	5.5	5.6	5.5	5.5	5.5	5.5	5.6	5.6	5.5	5.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	42	41.2	42	42	47.7	41.5	41.2	47.8	41.1	41.4
Design Heating Load [W]	4675.6	4805.2	4675.6	4689.8	5008.2	4773.2	4805.2	4930.6	4721.8	4675.6
Annual Energy Electricity [kWh/yr]	11667.4	11436.7	11667.4	11677.3	9500.4	11526.5	11436.7	9520.8	11414.3	11494.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,587.62	$ 1,554.98	$ 1,587.62	$ 1,589.02	$ 1,280.99	$ 1,567.68	$ 1,554.98	$ 1,283.88	$ 1,551.81	$ 1,563.16
Annual Energy Natural Gas [m3/yr]	0	0	0	0	362.1	0	0	362.1	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$ 156.2	$.	$.	$ 156.2	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	104290	98550	104578	103858	88393	100493	99198	90535	103716	104291
Upgrade Package List	Pkg4331302034	Pkg3331203034	Pkg4331402034	Pkg4321303034	Pkg3221201034	Pkg3341203034	Pkg3331303034	Pkg3231202033	Pkg4321302034	Pkg4331302034
GHGI [kg/m2]	0.55	0.54	0.55	0.55	3.4	0.54	0.54	3.4	0.54	0.54
% ICC	3.8%	3.8%	3.9%	3.9%	3.1%	3.9%	3.9%	3.1%	3.9%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	18.1	18.2	18.1	18	18.2	18.1	18.2	18.2	18.1	17.9
Output: MEUI [kWh/(m2 * yr)]	19.3	18.3	19.3	19.3	26	18.7	18.3	26.1	18.2	18.5
Output: Better than ERS (%)	4580.0%	4680.0%	4580.0%	4580.0%	3860.0%	4650.0%	4680.0%	3850.0%	4700.0%	4660.0%
Output: Better than Envelope (%)	3980.0%	3980.0%	3980.0%	4020.0%	3940.0%	4020.0%	3980.0%	3940.0%	3980.0%	4060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3697	3466	3697	3707	1530	3556	3466	1550	3444	3524
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 521.25	$ 488.72	$ 521.25	$ 522.64	$ 215.7	$ 501.38	$ 488.72	$ 218.58	$ 485.56	$ 496.87
Annual savings in carbon tax for electricity [$/year]	$ 1.85	$ 1.73	$ 1.85	$ 1.85	$ .76	$ 1.78	$ 1.73	$ .78	$ 1.72	$ 1.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 523.1	$ 490.45	$ 523.1	$ 524.5	$ 216.47	$ 503.16	$ 490.45	$ 219.35	$ 487.28	$ 498.63
Annual savings in GHG from electricity savings [kg CO2e/year]	40.7	38.1	40.7	40.8	16.8	39.1	38.1	17.1	37.9	38.8
Annual savings in natural gas [m3/year]	65.01	65.01	65.01	65.01	51.51	65.01	65.01	51.51	65.01	65.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 602.28	$ 602.28	$ 602.28	$ 602.28	$ 477.28	$ 602.28	$ 602.28	$ 477.28	$ 602.28	$ 602.28
Annual savings in carbon tax for natural gas [$/year]	$ 150.33	$ 150.33	$ 150.33	$ 150.33	$ 119.13	$ 150.33	$ 150.33	$ 119.13	$ 150.33	$ 150.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 752.6	$ 752.6	$ 752.6	$ 752.6	$ 596.41	$ 752.6	$ 752.6	$ 596.41	$ 752.6	$ 752.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	3340.6	3340.6	3340.6	3340.6	2647.3	3340.6	3340.6	2647.3	3340.6	3340.6
Net Present Value [$]	$ 14,754.24	$ 14,186.16	$ 15,050.52	$ 15,101.44	$ 8,529.24	$ 14,859.7	$ 14,647.04	$ 8,617.49	$ 14,637.66	$ 14,859.1
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	14.09	8.78	14.09	14.09	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR80	CeilR50	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 305.64	$ 1,163.13	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 1,286.55	$ 544.16	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,456.71	$ 2,213.87	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$.	$.	$.	$ 550.	$ 850.	$.	$ 850.	$ 550.

MEDIUM 023WWR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,171.89	$ 16,207.56	$ 16,392.63	$ 16,361.27	$ 16,580.53	$ 16,486.82	$ 16,455.46	$ 16,721.89	$ 16,757.56	$ 16,801.27
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,171.89	$ 16,207.56	$ 16,392.63	$ 16,361.27	$ 16,580.53	$ 16,486.82	$ 16,455.46	$ 16,721.89	$ 16,757.56	$ 16,801.27
Net Present Value [$]	$ 8,529.24	$ 8,617.49	$ 8,727.7	$ 8,755.5	$ 8,775.01	$ 8,775.52	$ 8,817.92	$ 8,837.45	$ 8,925.7	$ 8,949.01
Incremental dollars per GHG saving	$ 6.15	$ 6.16	$ 6.23	$ 6.22	$ 6.3	$ 6.27	$ 6.26	$ 6.23	$ 6.24	$ 6.39
Auxiliary Energy Required Heating [GJ/yr]	15.4	15.4	15.1	15.3	14.6	15	15.3	15.4	15.4	14.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4	13.5
Annual Energy Space Heating [GJ/yr]	5.5	5.6	5.5	5.6	5.3	5.4	5.5	5.5	5.6	5.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	47.7	47.8	47.7	47.7	47.5	47.6	47.7	46.6	46.7	47.4
Design Heating Load [W]	5008.2	4930.6	4953.9	4896.3	4843.9	4962.1	4904.5	5008.2	4930.6	4789.6
Annual Energy Electricity [kWh/yr]	9500.4	9520.8	9491.7	9514.7	9437.1	9473.7	9502.4	9501.1	9521.5	9419
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,280.99	$ 1,283.88	$ 1,279.76	$ 1,283.02	$ 1,272.03	$ 1,277.21	$ 1,281.27	$ 1,281.09	$ 1,283.98	$ 1,269.47
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	333	333	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	88393	90535	88609	96349	96151	90337	98077	88394	90536	96367
Upgrade Package List	Pkg3221201034	Pkg3231202033	Pkg3221202034	Pkg3321202032	Pkg3221201033	Pkg3321201034	Pkg3331201032	Pkg3221201034	Pkg3231202033	Pkg3321202033
GHGI [kg/m2]	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.17	3.17	3.4
% ICC	3.1%	3.1%	3.1%	3.1%	3.2%	3.2%	3.1%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.2	18.2	17.9	18.2	17.4	17.8	18.1	18.2	18.2	17
Output: MEUI [kWh/(m2 * yr)]	26	26.1	26	26.1	25.7	25.9	26	24.7	24.8	25.6
Output: Better than ERS (%)	3860.0%	3850.0%	3860.0%	3860.0%	3890.0%	3870.0%	3860.0%	4000.0%	3990.0%	3900.0%
Output: Better than Envelope (%)	3940.0%	3940.0%	4060.0%	3980.0%	4250.0%	4090.0%	3980.0%	3940.0%	3940.0%	4330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1530	1550	1521	1544	1466	1503	1532	1530	1551	1448
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 215.7	$ 218.58	$ 214.48	$ 217.72	$ 206.78	$ 211.94	$ 215.98	$ 215.8	$ 218.68	$ 204.22
Annual savings in carbon tax for electricity [$/year]	$ .76	$ .78	$ .76	$ .77	$ .73	$ .75	$ .77	$ .77	$ .78	$ .72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 216.47	$ 219.35	$ 215.24	$ 218.49	$ 207.51	$ 212.69	$ 216.75	$ 216.57	$ 219.45	$ 204.95
Annual savings in GHG from electricity savings [kg CO2e/year]	16.8	17.1	16.7	17	16.1	16.5	16.8	16.8	17.1	15.9
Annual savings in natural gas [m3/year]	51.51	51.51	51.51	51.51	51.51	51.51	51.51	52.6	52.6	51.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 477.28	$ 487.32	$ 487.32	$ 477.28
Annual savings in carbon tax for natural gas [$/year]	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 119.13	$ 121.63	$ 121.63	$ 119.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 596.41	$ 608.96	$ 608.96	$ 596.41
Annual savings in GHG from natural gas savings [kg CO2e/year]	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2647.3	2703	2703	2647.3
Net Present Value [$]	$ 8,529.24	$ 8,617.49	$ 8,727.7	$ 8,755.5	$ 8,775.01	$ 8,775.52	$ 8,817.92	$ 8,837.45	$ 8,925.7	$ 8,949.01
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	7.04	7.04	5.28	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 4,297.11	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.

MEDIUM 023WWR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 6,802.22	$ 6,902.22	$ 6,902.72	$ 6,996.91	$ 7,022.96	$ 7,103.82	$ 7,117.15	$ 7,122.96	$ 7,217.15	$ 7,217.65
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,298.78	$ 7,406.08	$ 7,406.62	$ 7,507.68	$ 7,535.64	$ 7,622.4	$ 7,636.7	$ 7,642.94	$ 7,744.	$ 7,744.54
Net Present Value [$]	$ 640.99	$ 1,712.52	$ 664.33	$ 586.28	$ 508.89	$ 768.29	$ 432.17	$ 1,584.	$ 1,502.98	$ 460.43
Incremental dollars per GHG saving	$ 4.96	$ 4.18	$ 4.84	$ 4.89	$ 5.05	$ 4.76	$ 5.1	$ 4.26	$ 4.31	$ 4.98
Auxiliary Energy Required Heating [GJ/yr]	27.9	32.4	36.6	36.5	27.5	35.4	27.5	32	32	36.2
Annual Energy DHW [GJ/yr]	23.6	13.5	13.5	13.5	23.6	13.5	23.6	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	29.5	34.3	38.8	38.7	29.2	37.5	29.1	33.9	33.8	38.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	79.6	74.2	78.6	78.6	79.2	77.3	79.1	73.8	73.7	78.2
Design Heating Load [W]	7837.8	8234.4	8000.1	8014.5	7768.5	8234.4	7782.9	8165.1	8179.5	7945.2
Annual Energy Electricity [kWh/yr]	7472.7	7496.5	7518.9	7518.5	7470.8	7512.4	7470.5	7494.5	7494.3	7516.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 994.07	$ 997.44	$ 1,000.61	$ 1,000.55	$ 993.8	$ 999.69	$ 993.76	$ 997.16	$ 997.13	$ 1,000.27
Annual Energy Natural Gas [m3/yr]	1413.8	1266.6	1384.8	1383	1403.8	1350.4	1401.8	1256.2	1254.7	1372.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 609.86	$ 546.37	$ 597.35	$ 596.58	$ 605.55	$ 582.52	$ 604.69	$ 541.88	$ 541.23	$ 591.96
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64153	54436	70690	73552	64423	54382	65773	54706	56056	73822
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2221102011	Pkg2231101011	Pkg2121102031	Pkg1121101021	Pkg2131101031	Pkg1121102031	Pkg1131101031	Pkg2231102011
GHGI [kg/m2]	11.9	10.7	11.66	11.65	11.82	11.38	11.8	10.61	10.6	11.56
% ICC	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33	38.4	43.4	43.3	32.6	41.9	32.6	37.9	37.9	42.9
Output: MEUI [kWh/(m2 * yr)]	63.9	57.5	62.8	62.7	63.5	61.3	63.4	57	57	62.3
Output: Better than ERS (%)	1560.0%	1600.0%	1100.0%	1100.0%	1600.0%	1250.0%	1610.0%	1640.0%	1650.0%	1140.0%
Output: Better than Envelope (%)	1670.0%	330.0%	930.0%	900.0%	1790.0%	570.0%	1790.0%	450.0%	450.0%	810.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	571	547	524	525	573	531	573	549	549	527
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 80.47	$ 77.11	$ 73.95	$ 74.01	$ 80.74	$ 74.87	$ 80.78	$ 77.39	$ 77.42	$ 74.29
Annual savings in carbon tax for electricity [$/year]	$ .29	$ .27	$ .26	$ .26	$ .29	$ .27	$ .29	$ .27	$ .27	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 80.75	$ 77.39	$ 74.22	$ 74.27	$ 81.02	$ 75.14	$ 81.07	$ 77.67	$ 77.7	$ 74.56
Annual savings in GHG from electricity savings [kg CO2e/year]	6.3	6	5.8	5.8	6.3	5.8	6.3	6	6	5.8
Annual savings in natural gas [m3/year]	26.57	32.06	27.65	27.72	26.95	28.94	27.02	32.45	32.5	28.12
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 246.2	$ 297.01	$ 256.21	$ 256.83	$ 249.65	$ 268.09	$ 250.34	$ 300.6	$ 301.12	$ 260.53
Annual savings in carbon tax for natural gas [$/year]	$ 61.45	$ 74.13	$ 63.95	$ 64.1	$ 62.31	$ 66.91	$ 62.48	$ 75.03	$ 75.16	$ 65.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 307.65	$ 371.15	$ 320.16	$ 320.94	$ 311.96	$ 335.	$ 312.83	$ 375.63	$ 376.28	$ 325.55
Annual savings in GHG from natural gas savings [kg CO2e/year]	1365.6	1647.4	1421.1	1424.5	1384.7	1487	1388.5	1667.3	1670.2	1445
Net Present Value [$]	$ 640.99	$ 1,712.52	$ 664.33	$ 586.28	$ 508.89	$ 768.29	$ 432.17	$ 1,584.	$ 1,502.98	$ 460.43
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$.	$.	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,083.2	$ 2,083.2	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 023WWR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 10,826.22	$ 11,046.96	$ 11,141.15	$ 11,326.22	$ 11,361.89	$ 11,376.22	$ 11,527.82	$ 11,546.96	$ 11,596.96	$ 11,641.15
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 11,616.53	$ 11,853.39	$ 11,954.45	$ 12,153.03	$ 12,191.31	$ 12,206.68	$ 12,369.35	$ 12,389.89	$ 12,443.54	$ 12,490.95
Net Present Value [$]	$ 10,295.81	$ 10,298.54	$ 10,377.76	$ 9,777.17	$ 10,502.28	$ 10,269.2	$ 10,232.38	$ 9,908.99	$ 10,393.36	$ 9,981.27
Incremental dollars per GHG saving	$ 2.71	$ 2.76	$ 2.79	$ 2.83	$ 2.84	$ 2.84	$ 2.88	$ 2.88	$ 2.9	$ 2.91
Auxiliary Energy Required Heating [GJ/yr]	35.6	35.2	35.2	32.7	34.8	35.4	35.7	32.3	35	32.3
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.8	7.8	7.3	7.8	7.8	7.3	7.8
Annual Energy Space Heating [GJ/yr]	14.9	14.6	14.5	13.4	14.4	14.6	14.7	13.3	14.5	13.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	53.1	52.8	52.8	51.7	52.7	52.3	52.1	51.6	52.2	51.5
Design Heating Load [W]	8489.8	8420.5	8434.9	7897.7	8365.6	8489.8	7897.7	7828.4	8420.5	7842.8
Annual Energy Electricity [kWh/yr]	14757.8	14673.1	14667.3	14362.1	14629.9	14533.8	14460.6	14327.6	14496.3	14319.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,024.91	$ 2,012.93	$ 2,012.11	$ 1,968.92	$ 2,006.82	$ 1,993.22	$ 1,982.86	$ 1,964.04	$ 1,987.91	$ 1,962.84
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	54448	54718	56068	64168	56338	54449	64114	64438	54719	65788
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg2121101031	Pkg1131102031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg1121102031	Pkg2131101031
GHGI [kg/m2]	0.69	0.69	0.69	0.67	0.69	0.68	0.68	0.67	0.68	0.67
% ICC	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.2	41.7	41.7	38.7	41.3	41.9	42.3	38.3	41.5	38.2
Output: MEUI [kWh/(m2 * yr)]	31.8	31.5	31.5	30.2	31.3	30.9	30.8	30	30.7	30
Output: Better than ERS (%)	4170.0%	4200.0%	4200.0%	4320.0%	4220.0%	4260.0%	4280.0%	4340.0%	4270.0%	4350.0%
Output: Better than Envelope (%)	630.0%	510.0%	510.0%	240.0%	390.0%	570.0%	660.0%	360.0%	450.0%	360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6714	6630	6624	6319	6586	6490	6417	6284	6453	6276
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 946.73	$ 934.79	$ 933.97	$ 890.94	$ 928.7	$ 915.15	$ 904.83	$ 886.07	$ 909.86	$ 884.87
Annual savings in carbon tax for electricity [$/year]	$ 3.36	$ 3.31	$ 3.31	$ 3.16	$ 3.29	$ 3.25	$ 3.21	$ 3.14	$ 3.23	$ 3.14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 950.09	$ 938.1	$ 937.28	$ 894.1	$ 931.99	$ 918.39	$ 908.03	$ 889.21	$ 913.09	$ 888.01
Annual savings in GHG from electricity savings [kg CO2e/year]	73.9	72.9	72.9	69.5	72.5	71.4	70.6	69.1	71	69
Annual savings in natural gas [m3/year]	79.25	79.25	79.25	79.25	79.25	79.25	79.25	79.25	79.25	79.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25	$ 734.25
Annual savings in carbon tax for natural gas [$/year]	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26	$ 183.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51	$ 917.51
Annual savings in GHG from natural gas savings [kg CO2e/year]	4072.6	4072.6	4072.6	4072.6	4072.6	4072.6	4072.6	4072.6	4072.6	4072.6
Net Present Value [$]	$ 10,295.81	$ 10,298.54	$ 10,377.76	$ 9,777.17	$ 10,502.28	$ 10,269.2	$ 10,232.38	$ 9,908.99	$ 10,393.36	$ 9,981.27
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.

MEDIUM 023WWR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 7,402.22	$ 7,622.96	$ 7,717.15	$ 6,902.22	$ 7,952.22	$ 7,937.89	$ 7,122.96	$ 7,217.15	$ 8,172.96	$ 8,252.22
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 7,942.58	$ 8,179.44	$ 8,280.5	$ 7,406.08	$ 8,532.73	$ 8,517.36	$ 7,642.94	$ 7,744.	$ 8,769.59	$ 8,854.63
Net Present Value [$]	$ 1,926.09	$ 1,796.85	$ 1,716.73	$ 1,712.52	$ 1,618.98	$ 1,586.33	$ 1,584.	$ 1,502.98	$ 1,488.4	$ 1,474.03
Incremental dollars per GHG saving	$ 4.1	$ 4.17	$ 4.22	$ 4.18	$ 4.27	$ 4.29	$ 4.26	$ 4.31	$ 4.34	$ 4.35
Auxiliary Energy Required Heating [GJ/yr]	29.5	29.1	29.1	32.4	29.5	28.7	32	32	29.1	29.5
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5	12.4	11.7
Annual Energy Space Heating [GJ/yr]	31.2	30.9	30.8	34.3	31.3	30.4	33.9	33.8	30.9	31.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	71.1	70.7	70.7	74.2	70	70.3	73.8	73.7	69.6	69.3
Design Heating Load [W]	7648.6	7579.3	7593.7	8234.4	7648.6	7524.4	8165.1	8179.5	7579.3	7648.6
Annual Energy Electricity [kWh/yr]	7481.3	7479.3	7479	7496.5	7481.3	7477.1	7494.5	7494.3	7479.4	7481.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 995.29	$ 995.01	$ 994.96	$ 997.44	$ 995.29	$ 994.69	$ 997.16	$ 997.13	$ 995.02	$ 995.29
Annual Energy Natural Gas [m3/yr]	1186.1	1175.8	1174.2	1266.6	1157.1	1164	1256.2	1254.7	1146.9	1138.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 511.64	$ 507.2	$ 506.51	$ 546.37	$ 499.13	$ 502.11	$ 541.88	$ 541.23	$ 494.73	$ 491.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64156	64426	65776	54436	64157	66046	54706	56056	64427	64158
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg1121101031	Pkg2121101031	Pkg2131102031	Pkg1121102031	Pkg1131101031	Pkg2121102031	Pkg2121101031
GHGI [kg/m2]	10.04	9.96	9.94	10.7	9.8	9.86	10.61	10.6	9.72	9.65
% ICC	1.4%	1.5%	1.5%	1.3%	1.5%	1.5%	1.4%	1.4%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35	34.5	34.5	38.4	35	34	37.9	37.9	34.5	35
Output: MEUI [kWh/(m2 * yr)]	53.9	53.4	53.4	57.5	52.6	52.9	57	57	52.2	51.8
Output: Better than ERS (%)	1950.0%	1990.0%	1990.0%	1600.0%	2070.0%	2040.0%	1640.0%	1650.0%	2120.0%	2150.0%
Output: Better than Envelope (%)	1190.0%	1310.0%	1310.0%	330.0%	1190.0%	1430.0%	450.0%	450.0%	1310.0%	1190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	562	564	564	547	562	566	549	549	564	562
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 79.26	$ 79.54	$ 79.58	$ 77.11	$ 79.26	$ 79.85	$ 77.39	$ 77.42	$ 79.52	$ 79.26
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .28	$ .28	$ .27	$ .28	$ .28	$ .27	$ .27	$ .28	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 79.54	$ 79.82	$ 79.86	$ 77.39	$ 79.54	$ 80.13	$ 77.67	$ 77.7	$ 79.81	$ 79.54
Annual savings in GHG from electricity savings [kg CO2e/year]	6.2	6.2	6.2	6	6.2	6.2	6	6	6.2	6.2
Annual savings in natural gas [m3/year]	35.06	35.44	35.5	32.06	36.14	35.88	32.45	32.5	36.52	36.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 324.8	$ 328.36	$ 328.91	$ 297.01	$ 334.81	$ 332.43	$ 300.6	$ 301.12	$ 338.33	$ 341.2
Annual savings in carbon tax for natural gas [$/year]	$ 81.07	$ 81.96	$ 82.09	$ 74.13	$ 83.57	$ 82.97	$ 75.03	$ 75.16	$ 84.45	$ 85.16
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 405.87	$ 410.31	$ 411.	$ 371.15	$ 418.38	$ 415.4	$ 375.63	$ 376.28	$ 422.78	$ 426.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	1801.5	1821.3	1824.3	1647.4	1857.1	1843.9	1667.3	1670.2	1876.6	1892.5
Net Present Value [$]	$ 1,926.09	$ 1,796.85	$ 1,716.73	$ 1,712.52	$ 1,618.98	$ 1,586.33	$ 1,584.	$ 1,502.98	$ 1,488.4	$ 1,474.03
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.

MEDIUM 023WWR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,300.85	$ 9,315.18	$ 9,535.92	$ 9,615.18	$ 9,630.11	$ 9,835.92	$ 9,850.85	$ 9,930.11	$ 9,952.22	$ 10,052.22
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,979.81	$ 9,995.19	$ 10,232.04	$ 10,317.09	$ 10,333.11	$ 10,553.94	$ 10,569.96	$ 10,655.01	$ 10,678.73	$ 10,786.03
Net Present Value [$]	$ 855.22	$ 889.8	$ 759.59	$ 745.58	$ 677.59	$ 615.18	$ 547.19	$ 533.37	$ 6,763.89	$ 389.86
Incremental dollars per GHG saving	$ 4.68	$ 4.66	$ 4.72	$ 4.72	$ 4.76	$ 4.79	$ 4.82	$ 4.83	$ 3.53	$ 4.95
Auxiliary Energy Required Heating [GJ/yr]	26.2	26.9	26.6	27	26.5	26.6	26.2	26.5	27.9	27
Annual Energy DHW [GJ/yr]	13.5	12.4	12.4	11.7	12.4	11.7	12.4	11.7	23.6	11.7
Annual Energy Space Heating [GJ/yr]	27.7	28.5	28.2	28.5	28.1	28.2	27.7	28.1	11.5	28.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7
Total Energy [GJ/yr]	67.6	67.3	66.9	66.6	66.9	66.2	66.5	66.2	65.6	67.6
Design Heating Load [W]	7177	7301.2	7231.9	7301.2	7246.4	7231.9	7177	7246.4	7897.7	6977.5
Annual Energy Electricity [kWh/yr]	7463.6	7467.8	7465.8	7467.8	7465.6	7465.9	7463.7	7465.6	11659.3	7734.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 992.78	$ 993.38	$ 993.1	$ 993.38	$ 993.07	$ 993.11	$ 992.8	$ 993.07	$ 1,586.48	$ 1,031.07
Annual Energy Natural Gas [m3/yr]	1092.7	1085.6	1075.4	1067	1074	1056.8	1063.8	1055.4	635	1068.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 471.35	$ 468.29	$ 463.89	$ 460.27	$ 463.29	$ 455.87	$ 458.89	$ 455.26	$ 273.92	$ 460.91
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	73930	70529	70799	70530	73661	70800	73931	73662	64162	64194
Upgrade Package List	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2121101031	Pkg2121101033
GHGI [kg/m2]	9.28	9.22	9.13	9.07	9.12	8.98	9.04	8.97	5.73	9.09
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31	31.9	31.5	31.9	31.4	31.5	31	31.4	33	32
Output: MEUI [kWh/(m2 * yr)]	49.7	49.4	48.9	48.6	48.9	48.1	48.4	48.1	46.6	49.8
Output: Better than ERS (%)	2340.0%	2380.0%	2420.0%	2460.0%	2420.0%	2500.0%	2470.0%	2500.0%	3240.0%	2340.0%
Output: Better than Envelope (%)	2180.0%	1970.0%	2060.0%	1940.0%	2090.0%	2060.0%	2180.0%	2090.0%	1670.0%	1940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	580	576	578	576	578	578	580	578	3616	309
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 81.75	$ 81.16	$ 81.44	$ 81.16	$ 81.47	$ 81.43	$ 81.74	$ 81.47	$ 509.84	$ 43.6
Annual savings in carbon tax for electricity [$/year]	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ 1.81	$ .15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 82.04	$ 81.45	$ 81.73	$ 81.45	$ 81.76	$ 81.72	$ 82.03	$ 81.76	$ 511.65	$ 43.75
Annual savings in GHG from electricity savings [kg CO2e/year]	6.4	6.3	6.4	6.3	6.4	6.4	6.4	6.4	39.8	3.4
Annual savings in natural gas [m3/year]	38.54	38.8	39.18	39.49	39.23	39.87	39.61	39.93	55.59	39.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 357.04	$ 359.5	$ 363.02	$ 365.92	$ 363.5	$ 369.44	$ 367.02	$ 369.92	$ 515.04	$ 365.4
Annual savings in carbon tax for natural gas [$/year]	$ 89.12	$ 89.73	$ 90.61	$ 91.33	$ 90.73	$ 92.21	$ 91.61	$ 92.33	$ 128.55	$ 91.2
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 446.16	$ 449.22	$ 453.62	$ 457.25	$ 454.23	$ 461.65	$ 458.63	$ 462.25	$ 643.6	$ 456.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	1980.4	1994	2013.5	2029.6	2016.2	2049.1	2035.7	2051.8	2856.7	2026.7
Net Present Value [$]	$ 855.22	$ 889.8	$ 759.59	$ 745.58	$ 677.59	$ 615.18	$ 547.19	$ 533.37	$ 6,763.89	$ 389.86
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 3,150.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.

MEDIUM 023WWR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,952.22	$ 11,915.18	$ 11,912.22	$ 10,172.96	$ 14,489.18	$ 12,135.92	$ 12,132.96	$ 14,584.85	$ 10,267.15	$ 10,502.22
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 10,678.73	$ 12,784.99	$ 12,781.81	$ 10,915.59	$ 15,546.89	$ 13,021.84	$ 13,018.67	$ 15,649.54	$ 11,016.65	$ 11,268.88
Net Present Value [$]	$ 6,763.89	$ 6,045.77	$ 7,353.41	$ 6,864.13	$ 12,329.74	$ 6,185.63	$ 7,493.63	$ 12,590.11	$ 6,943.42	$ 7,027.33
Incremental dollars per GHG saving	$ 3.53	$ 3.57	$ 3.57	$ 3.61	$ 3.62	$ 3.63	$ 3.64	$ 3.64	$ 3.64	$ 3.64
Auxiliary Energy Required Heating [GJ/yr]	27.9	26.9	28.2	27.5	27.5	26.5	27.8	28	27.4	27.9
Annual Energy DHW [GJ/yr]	23.6	13.5	13.5	23.6	7.8	13.5	13.5	7.8	23.6	22.4
Annual Energy Space Heating [GJ/yr]	11.5	11	11.8	11.3	11.5	10.9	11.7	11.7	11.3	11.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	1.7	0.7	1.7	0.7	1.7	1.7	0.7	0.7
Total Energy [GJ/yr]	65.6	54.9	56.7	65.5	50.9	54.8	56.6	51.1	65.4	64.3
Design Heating Load [W]	7897.7	7359.9	7172.3	7828.4	6879.3	7290.6	7103	6891.2	7842.8	7897.7
Annual Energy Electricity [kWh/yr]	11659.3	11505.8	12014.9	11612.5	14125	11474.4	11983.6	14189	11607.7	11659.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,586.48	$ 1,564.76	$ 1,636.79	$ 1,579.85	$ 1,935.37	$ 1,560.31	$ 1,632.36	$ 1,944.43	$ 1,579.17	$ 1,586.48
Annual Energy Natural Gas [m3/yr]	635	362.1	362.1	635	0	362.1	362.1	0	634.7	600.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 273.92	$ 156.2	$ 156.2	$ 273.92	$.	$ 156.2	$ 156.2	$.	$ 273.79	$ 259.16
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64162	70537	64183	64432	70576	70807	64453	73960	65782	64163
Upgrade Package List	Pkg2121101031	Pkg2221101031	Pkg2121101032	Pkg2121102031	Pkg2221101033	Pkg2221102031	Pkg2121102032	Pkg2231102032	Pkg2131101031	Pkg2121101031
GHGI [kg/m2]	5.73	3.5	3.52	5.73	0.66	3.5	3.52	0.67	5.73	5.45
% ICC	1.9%	2.3%	2.3%	1.9%	2.8%	2.3%	2.3%	2.8%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33	31.9	33.4	32.6	32.6	31.4	32.9	33.2	32.5	33
Output: MEUI [kWh/(m2 * yr)]	46.6	33.9	36.1	46.4	29.1	33.8	36	29.4	46.4	45.1
Output: Better than ERS (%)	3240.0%	3960.0%	3760.0%	3250.0%	4410.0%	3970.0%	3770.0%	4390.0%	3260.0%	3370.0%
Output: Better than Envelope (%)	1670.0%	1970.0%	1580.0%	1790.0%	1790.0%	2090.0%	1700.0%	1640.0%	1820.0%	1670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3616	3462	3972	3569	6082	3431	3940	6146	3564	3616
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 509.84	$ 488.2	$ 559.98	$ 503.24	$ 857.51	$ 483.77	$ 555.57	$ 866.53	$ 502.57	$ 509.84
Annual savings in carbon tax for electricity [$/year]	$ 1.81	$ 1.73	$ 1.99	$ 1.78	$ 3.04	$ 1.72	$ 1.97	$ 3.07	$ 1.78	$ 1.81
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 511.65	$ 489.93	$ 561.97	$ 505.03	$ 860.55	$ 485.49	$ 557.54	$ 869.6	$ 504.35	$ 511.65
Annual savings in GHG from electricity savings [kg CO2e/year]	39.8	38.1	43.7	39.3	66.9	37.7	43.3	67.6	39.2	39.8
Annual savings in natural gas [m3/year]	55.59	65.76	65.76	55.59	79.25	65.76	65.76	79.25	55.6	56.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 515.04	$ 609.25	$ 609.25	$ 515.04	$ 734.25	$ 609.25	$ 609.25	$ 734.25	$ 515.15	$ 526.85
Annual savings in carbon tax for natural gas [$/year]	$ 128.55	$ 152.07	$ 152.07	$ 128.55	$ 183.26	$ 152.07	$ 152.07	$ 183.26	$ 128.58	$ 131.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 643.6	$ 761.32	$ 761.32	$ 643.6	$ 917.51	$ 761.32	$ 761.32	$ 917.51	$ 643.73	$ 658.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	2856.7	3379.2	3379.2	2856.7	4072.6	3379.2	3379.2	4072.6	2857.3	2922.2
Net Present Value [$]	$ 6,763.89	$ 6,045.77	$ 7,353.41	$ 6,864.13	$ 12,329.74	$ 6,185.63	$ 7,493.63	$ 12,590.11	$ 6,943.42	$ 7,027.33
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	8.78	10.51	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	5.28	3.87	3.87	5.28	5.28	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	HRV sre 60	NA	HRV sre 75	NA	HRV sre 60	HRV sre 60	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$ 1,360.	$.	$ 1,800.	$.	$ 1,360.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$ 600.	$.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.

MEDIUM 023WWR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 9,315.18	$ 9,300.85	$ 9,535.92	$ 9,615.18	$ 9,630.11	$ 9,835.92	$ 9,850.85	$ 9,930.11	$ 10,150.85	$ 10,052.22
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,995.19	$ 9,979.81	$ 10,232.04	$ 10,317.09	$ 10,333.11	$ 10,553.94	$ 10,569.96	$ 10,655.01	$ 10,891.86	$ 10,786.03
Net Present Value [$]	$ 889.8	$ 855.22	$ 759.59	$ 745.58	$ 677.59	$ 615.18	$ 547.19	$ 533.37	$ 402.97	$ 389.86
Incremental dollars per GHG saving	$ 4.66	$ 4.68	$ 4.72	$ 4.72	$ 4.76	$ 4.79	$ 4.82	$ 4.83	$ 4.89	$ 4.95
Auxiliary Energy Required Heating [GJ/yr]	26.9	26.2	26.6	27	26.5	26.6	26.2	26.5	26.2	27
Annual Energy DHW [GJ/yr]	12.4	13.5	12.4	11.7	12.4	11.7	12.4	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	28.5	27.7	28.2	28.5	28.1	28.2	27.7	28.1	27.7	28.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7
Total Energy [GJ/yr]	67.3	67.6	66.9	66.6	66.9	66.2	66.5	66.2	65.8	67.6
Design Heating Load [W]	7301.2	7177	7231.9	7301.2	7246.4	7231.9	7177	7246.4	7177	6977.5
Annual Energy Electricity [kWh/yr]	7467.8	7463.6	7465.8	7467.8	7465.6	7465.9	7463.7	7465.6	7463.7	7734.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 993.38	$ 992.78	$ 993.1	$ 993.38	$ 993.07	$ 993.11	$ 992.8	$ 993.07	$ 992.8	$ 1,031.07
Annual Energy Natural Gas [m3/yr]	1085.6	1092.7	1075.4	1067	1074	1056.8	1063.8	1055.4	1045.2	1068.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 468.29	$ 471.35	$ 463.89	$ 460.27	$ 463.29	$ 455.87	$ 458.89	$ 455.26	$ 450.86	$ 460.91
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70529	73930	70799	70530	73661	70800	73931	73662	73932	64194
Upgrade Package List	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2231102031	Pkg2121101033
GHGI [kg/m2]	9.22	9.28	9.13	9.07	9.12	8.98	9.04	8.97	8.89	9.09
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.9	31	31.5	31.9	31.4	31.5	31	31.4	31	32
Output: MEUI [kWh/(m2 * yr)]	49.4	49.7	48.9	48.6	48.9	48.1	48.4	48.1	47.6	49.8
Output: Better than ERS (%)	2380.0%	2340.0%	2420.0%	2460.0%	2420.0%	2500.0%	2470.0%	2500.0%	2550.0%	2340.0%
Output: Better than Envelope (%)	1970.0%	2180.0%	2060.0%	1940.0%	2090.0%	2060.0%	2180.0%	2090.0%	2180.0%	1940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	576	580	578	576	578	578	580	578	580	309
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 81.16	$ 81.75	$ 81.44	$ 81.16	$ 81.47	$ 81.43	$ 81.74	$ 81.47	$ 81.74	$ 43.6
Annual savings in carbon tax for electricity [$/year]	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .29	$ .15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 81.45	$ 82.04	$ 81.73	$ 81.45	$ 81.76	$ 81.72	$ 82.03	$ 81.76	$ 82.03	$ 43.75
Annual savings in GHG from electricity savings [kg CO2e/year]	6.3	6.4	6.4	6.3	6.4	6.4	6.4	6.4	6.4	3.4
Annual savings in natural gas [m3/year]	38.8	38.54	39.18	39.49	39.23	39.87	39.61	39.93	40.31	39.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 359.5	$ 357.04	$ 363.02	$ 365.92	$ 363.5	$ 369.44	$ 367.02	$ 369.92	$ 373.44	$ 365.4
Annual savings in carbon tax for natural gas [$/year]	$ 89.73	$ 89.12	$ 90.61	$ 91.33	$ 90.73	$ 92.21	$ 91.61	$ 92.33	$ 93.21	$ 91.2
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 449.22	$ 446.16	$ 453.62	$ 457.25	$ 454.23	$ 461.65	$ 458.63	$ 462.25	$ 466.65	$ 456.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	1994	1980.4	2013.5	2029.6	2016.2	2049.1	2035.7	2051.8	2071.3	2026.7
Net Present Value [$]	$ 889.8	$ 855.22	$ 759.59	$ 745.58	$ 677.59	$ 615.18	$ 547.19	$ 533.37	$ 402.97	$ 389.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.

MEDIUM 023WWR Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 19,713.83	$ 20,010.11	$ 20,263.83	$ 20,456.22	$ 20,560.11	$ 20,563.83	$ 20,752.5	$ 20,860.11	$ 21,006.22	$ 21,302.5
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,152.94	$ 21,470.85	$ 21,743.09	$ 21,949.52	$ 22,061.	$ 22,064.99	$ 22,267.43	$ 22,382.9	$ 22,539.67	$ 22,857.58
Net Present Value [$]	$ 12,330.43	$ 12,626.71	$ 12,637.48	$ 12,994.67	$ 12,933.76	$ 12,782.19	$ 13,290.95	$ 13,078.47	$ 13,301.91	$ 13,598.19
Incremental dollars per GHG saving	$ 5.89	$ 5.98	$ 5.95	$ 6.11	$ 6.04	$ 5.98	$ 6.2	$ 6.07	$ 6.17	$ 6.26
Auxiliary Energy Required Heating [GJ/yr]	18.3	18.3	18.3	18	18.3	18.3	18	18.3	18	18
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	12.4	11.7	13.5	11.7	12.4	12.4
Annual Energy Space Heating [GJ/yr]	7.7	7.7	7.7	7.6	7.7	7.7	7.6	7.7	7.6	7.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.8	52.8	51.7	52.7	51.7	51	52.7	51	51.6	51.6
Design Heating Load [W]	5728.7	5728.7	5728.7	5690.5	5728.7	5728.7	5690.5	5728.7	5690.5	5690.5
Annual Energy Electricity [kWh/yr]	10917.7	10917.7	10918.4	10887.4	10918.4	10918.9	10888.9	10918.9	10888.1	10888.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,481.54	$ 1,481.54	$ 1,481.64	$ 1,477.25	$ 1,481.64	$ 1,481.71	$ 1,477.25	$ 1,481.71	$ 1,477.35	$ 1,477.35
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	362.1	332.9	314.2	362.1	314.2	332.9	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 143.6	$ 135.53	$ 156.2	$ 135.53	$ 143.6	$ 143.6
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	104431	104719	104432	105007	104720	104433	105295	104721	105008	105296
Upgrade Package List	Pkg4331303034	Pkg4331403034	Pkg4331303034	Pkg4341303034	Pkg4331403034	Pkg4331303034	Pkg4341403034	Pkg4331403034	Pkg4341303034	Pkg4341403034
GHGI [kg/m2]	3.47	3.47	3.23	3.47	3.23	3.08	3.47	3.08	3.23	3.23
% ICC	3.8%	3.8%	3.9%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.3	21.7	21.7	21.3	21.7	21.4	21.4
Output: MEUI [kWh/(m2 * yr)]	31.4	31.4	30.1	31.3	30.1	29.3	31.3	29.3	30	30
Output: Better than ERS (%)	4190.0%	4190.0%	4310.0%	4200.0%	4310.0%	4390.0%	4200.0%	4390.0%	4320.0%	4320.0%
Output: Better than Envelope (%)	4540.0%	4540.0%	4540.0%	4630.0%	4540.0%	4540.0%	4630.0%	4540.0%	4630.0%	4630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2874	2874	2875	2844	2875	2876	2844	2876	2845	2845
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 405.28	$ 405.28	$ 405.37	$ 401.	$ 405.37	$ 405.45	$ 401.	$ 405.45	$ 401.1	$ 401.1
Annual savings in carbon tax for electricity [$/year]	$ 1.44	$ 1.44	$ 1.44	$ 1.42	$ 1.44	$ 1.44	$ 1.42	$ 1.44	$ 1.42	$ 1.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 406.71	$ 406.71	$ 406.81	$ 402.43	$ 406.81	$ 406.88	$ 402.43	$ 406.88	$ 402.53	$ 402.53
Annual savings in GHG from electricity savings [kg CO2e/year]	31.6	31.6	31.6	31.3	31.6	31.6	31.3	31.6	31.3	31.3
Annual savings in natural gas [m3/year]	65.76	65.76	66.85	65.76	66.85	67.54	65.76	67.54	66.85	66.85
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 609.25	$ 609.25	$ 619.33	$ 609.25	$ 619.33	$ 625.79	$ 609.25	$ 625.79	$ 619.33	$ 619.33
Annual savings in carbon tax for natural gas [$/year]	$ 152.07	$ 152.07	$ 154.58	$ 152.07	$ 154.58	$ 156.19	$ 152.07	$ 156.19	$ 154.58	$ 154.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 761.32	$ 761.32	$ 773.91	$ 761.32	$ 773.91	$ 781.98	$ 761.32	$ 781.98	$ 773.91	$ 773.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	3379.2	3379.2	3435.2	3379.2	3435.2	3471	3379.2	3471	3435.2	3435.2
Net Present Value [$]	$ 12,330.43	$ 12,626.71	$ 12,637.48	$ 12,994.67	$ 12,933.76	$ 12,782.19	$ 13,290.95	$ 13,078.47	$ 13,301.91	$ 13,598.19
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 1,286.55	$ 544.16	$ 544.16	$ 1,286.55	$ 544.16	$ 1,286.55	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.	$ 550.	$ 550.

MEDIUM 023WWR Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,713.83	$ 20,263.83	$ 20,010.11	$ 20,563.83	$ 20,560.11	$ 20,860.11	$ 20,456.22	$ 21,006.22	$ 21,306.22	$ 20,752.5
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,152.94	$ 21,743.09	$ 21,470.85	$ 22,064.99	$ 22,061.	$ 22,382.9	$ 21,949.52	$ 22,539.67	$ 22,861.57	$ 22,267.43
Net Present Value [$]	$ 12,330.43	$ 12,637.48	$ 12,626.71	$ 12,782.19	$ 12,933.76	$ 13,078.47	$ 12,994.67	$ 13,301.91	$ 13,446.44	$ 13,290.95
Incremental dollars per GHG saving	$ 5.89	$ 5.95	$ 5.98	$ 5.98	$ 6.04	$ 6.07	$ 6.11	$ 6.17	$ 6.19	$ 6.2
Auxiliary Energy Required Heating [GJ/yr]	18.3	18.3	18.3	18.3	18.3	18.3	18	18	18	18
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	12.4	11.7	13.5	12.4	11.7	13.5
Annual Energy Space Heating [GJ/yr]	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.8	51.7	52.8	51	51.7	51	52.7	51.6	50.9	52.7
Design Heating Load [W]	5728.7	5728.7	5728.7	5728.7	5728.7	5728.7	5690.5	5690.5	5690.5	5690.5
Annual Energy Electricity [kWh/yr]	10917.7	10918.4	10917.7	10918.9	10918.4	10918.9	10887.4	10888.1	10888.6	10887.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,481.54	$ 1,481.64	$ 1,481.54	$ 1,481.71	$ 1,481.64	$ 1,481.71	$ 1,477.25	$ 1,477.35	$ 1,477.42	$ 1,477.25
Annual Energy Natural Gas [m3/yr]	362.1	332.9	362.1	314.2	332.9	314.2	362.1	332.9	314.2	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.6	$ 156.2	$ 135.53	$ 143.6	$ 135.53	$ 156.2	$ 143.6	$ 135.53	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	104431	104432	104719	104433	104720	104721	105007	105008	105009	105295
Upgrade Package List	Pkg4331303034	Pkg4331303034	Pkg4331403034	Pkg4331303034	Pkg4331403034	Pkg4331403034	Pkg4341303034	Pkg4341303034	Pkg4341303034	Pkg4341403034
GHGI [kg/m2]	3.47	3.23	3.47	3.08	3.23	3.08	3.47	3.23	3.08	3.47
% ICC	3.8%	3.9%	3.8%	3.9%	3.9%	4.0%	3.9%	4.0%	4.1%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.7	21.7	21.7	21.3	21.4	21.4	21.3
Output: MEUI [kWh/(m2 * yr)]	31.4	30.1	31.4	29.3	30.1	29.3	31.3	30	29.2	31.3
Output: Better than ERS (%)	4190.0%	4310.0%	4190.0%	4390.0%	4310.0%	4390.0%	4200.0%	4320.0%	4400.0%	4200.0%
Output: Better than Envelope (%)	4540.0%	4540.0%	4540.0%	4540.0%	4540.0%	4540.0%	4630.0%	4630.0%	4630.0%	4630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2874	2875	2874	2876	2875	2876	2844	2845	2845	2844
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 405.28	$ 405.37	$ 405.28	$ 405.45	$ 405.37	$ 405.45	$ 401.	$ 401.1	$ 401.17	$ 401.
Annual savings in carbon tax for electricity [$/year]	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.42	$ 1.42	$ 1.42	$ 1.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 406.71	$ 406.81	$ 406.71	$ 406.88	$ 406.81	$ 406.88	$ 402.43	$ 402.53	$ 402.6	$ 402.43
Annual savings in GHG from electricity savings [kg CO2e/year]	31.6	31.6	31.6	31.6	31.6	31.6	31.3	31.3	31.3	31.3
Annual savings in natural gas [m3/year]	65.76	66.85	65.76	67.54	66.85	67.54	65.76	66.85	67.54	65.76
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 609.25	$ 619.33	$ 609.25	$ 625.79	$ 619.33	$ 625.79	$ 609.25	$ 619.33	$ 625.79	$ 609.25
Annual savings in carbon tax for natural gas [$/year]	$ 152.07	$ 154.58	$ 152.07	$ 156.19	$ 154.58	$ 156.19	$ 152.07	$ 154.58	$ 156.19	$ 152.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 761.32	$ 773.91	$ 761.32	$ 781.98	$ 773.91	$ 781.98	$ 761.32	$ 773.91	$ 781.98	$ 761.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	3379.2	3435.2	3379.2	3471	3435.2	3471	3379.2	3435.2	3471	3379.2
Net Present Value [$]	$ 12,330.43	$ 12,637.48	$ 12,626.71	$ 12,782.19	$ 12,933.76	$ 13,078.47	$ 12,994.67	$ 13,301.91	$ 13,446.44	$ 13,290.95
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.

MEDIUM 023WWR Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 19,713.83	$ 20,010.11	$ 20,263.83	$ 20,563.83	$ 20,560.11	$ 20,456.22	$ 20,860.11	$ 20,752.5	$ 21,006.22	$ 21,306.22
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,152.94	$ 21,470.85	$ 21,743.09	$ 22,064.99	$ 22,061.	$ 21,949.52	$ 22,382.9	$ 22,267.43	$ 22,539.67	$ 22,861.57
Net Present Value [$]	$ 12,330.43	$ 12,626.71	$ 12,637.48	$ 12,782.19	$ 12,933.76	$ 12,994.67	$ 13,078.47	$ 13,290.95	$ 13,301.91	$ 13,446.44
Incremental dollars per GHG saving	$ 5.89	$ 5.98	$ 5.95	$ 5.98	$ 6.04	$ 6.11	$ 6.07	$ 6.2	$ 6.17	$ 6.19
Auxiliary Energy Required Heating [GJ/yr]	18.3	18.3	18.3	18.3	18.3	18	18.3	18	18	18
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	11.7	12.4	13.5	11.7	13.5	12.4	11.7
Annual Energy Space Heating [GJ/yr]	7.7	7.7	7.7	7.7	7.7	7.6	7.7	7.6	7.6	7.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	52.8	52.8	51.7	51	51.7	52.7	51	52.7	51.6	50.9
Design Heating Load [W]	5728.7	5728.7	5728.7	5728.7	5728.7	5690.5	5728.7	5690.5	5690.5	5690.5
Annual Energy Electricity [kWh/yr]	10917.7	10917.7	10918.4	10918.9	10918.4	10887.4	10918.9	10887.4	10888.1	10888.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,481.54	$ 1,481.54	$ 1,481.64	$ 1,481.71	$ 1,481.64	$ 1,477.25	$ 1,481.71	$ 1,477.25	$ 1,477.35	$ 1,477.42
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	314.2	332.9	362.1	314.2	362.1	332.9	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 135.53	$ 143.6	$ 156.2	$ 135.53	$ 156.2	$ 143.6	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	104431	104719	104432	104433	104720	105007	104721	105295	105008	105009
Upgrade Package List	Pkg4331303034	Pkg4331403034	Pkg4331303034	Pkg4331303034	Pkg4331403034	Pkg4341303034	Pkg4331403034	Pkg4341403034	Pkg4341303034	Pkg4341303034
GHGI [kg/m2]	3.47	3.47	3.23	3.08	3.23	3.47	3.08	3.47	3.23	3.08
% ICC	3.8%	3.8%	3.9%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.7	21.7	21.3	21.7	21.3	21.4	21.4
Output: MEUI [kWh/(m2 * yr)]	31.4	31.4	30.1	29.3	30.1	31.3	29.3	31.3	30	29.2
Output: Better than ERS (%)	4190.0%	4190.0%	4310.0%	4390.0%	4310.0%	4200.0%	4390.0%	4200.0%	4320.0%	4400.0%
Output: Better than Envelope (%)	4540.0%	4540.0%	4540.0%	4540.0%	4540.0%	4630.0%	4540.0%	4630.0%	4630.0%	4630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2874	2874	2875	2876	2875	2844	2876	2844	2845	2845
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 405.28	$ 405.28	$ 405.37	$ 405.45	$ 405.37	$ 401.	$ 405.45	$ 401.	$ 401.1	$ 401.17
Annual savings in carbon tax for electricity [$/year]	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.42	$ 1.44	$ 1.42	$ 1.42	$ 1.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 406.71	$ 406.71	$ 406.81	$ 406.88	$ 406.81	$ 402.43	$ 406.88	$ 402.43	$ 402.53	$ 402.6
Annual savings in GHG from electricity savings [kg CO2e/year]	31.6	31.6	31.6	31.6	31.6	31.3	31.6	31.3	31.3	31.3
Annual savings in natural gas [m3/year]	65.76	65.76	66.85	67.54	66.85	65.76	67.54	65.76	66.85	67.54
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 609.25	$ 609.25	$ 619.33	$ 625.79	$ 619.33	$ 609.25	$ 625.79	$ 609.25	$ 619.33	$ 625.79
Annual savings in carbon tax for natural gas [$/year]	$ 152.07	$ 152.07	$ 154.58	$ 156.19	$ 154.58	$ 152.07	$ 156.19	$ 152.07	$ 154.58	$ 156.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 761.32	$ 761.32	$ 773.91	$ 781.98	$ 773.91	$ 761.32	$ 781.98	$ 761.32	$ 773.91	$ 781.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	3379.2	3379.2	3435.2	3471	3435.2	3379.2	3471	3379.2	3435.2	3471
Net Present Value [$]	$ 12,330.43	$ 12,626.71	$ 12,637.48	$ 12,782.19	$ 12,933.76	$ 12,994.67	$ 13,078.47	$ 13,290.95	$ 13,301.91	$ 13,446.44
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 1,286.55	$ 544.16	$ 1,286.55	$ 1,286.55	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.

MEDIUM 023WWR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,352.22	$ 7,402.22	$ 7,572.96	$ 7,622.96	$ 7,652.22	$ 7,667.15	$ 7,672.96	$ 7,717.15	$ 7,752.22	$ 7,767.15
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 8,278.6	$ 8,334.9	$ 8,527.15	$ 8,583.45	$ 8,616.4	$ 8,633.21	$ 8,639.75	$ 8,689.51	$ 8,729.	$ 8,745.81
Net Present Value [$]	$ 3,330.98	$ 4,905.12	$ 3,225.58	$ 4,802.33	$ 3,237.23	$ 3,149.83	$ 3,954.92	$ 4,721.49	$ 3,931.75	$ 3,873.84
Incremental dollars per GHG saving	$ 3.54	$ 3.02	$ 3.61	$ 3.08	$ 3.61	$ 3.64	$ 3.33	$ 3.11	$ 3.34	$ 3.36
Auxiliary Energy Required Heating [GJ/yr]	40.9	42.5	40.4	42	40.9	40.4	46.3	41.9	46.8	46.2
Annual Energy DHW [GJ/yr]	23.2	14.3	23.2	14.3	22.3	23.2	13	14.3	12.3	13
Annual Energy Space Heating [GJ/yr]	43.3	45	42.8	44.5	43.3	42.8	49	44.4	49.6	49
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	92.9	85.6	92.4	85.1	92	92.3	88.5	85	88.2	88.4
Design Heating Load [W]	10291.8	10006.1	10201.9	9916.2	10291.8	10227.5	10817.1	9941.8	10907	10842.8
Annual Energy Electricity [kWh/yr]	7543	7551.1	7540.5	7548.6	7543	7540.2	7571.4	7548.3	7574	7571.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,004.02	$ 1,005.17	$ 1,003.67	$ 1,004.81	$ 1,004.02	$ 1,003.62	$ 1,008.04	$ 1,004.77	$ 1,008.41	$ 1,008.
Annual Energy Natural Gas [m3/yr]	1765.2	1568.8	1752.2	1555.5	1740.6	1750.1	1643.7	1554	1636.2	1642.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 761.45	$ 676.73	$ 755.84	$ 670.99	$ 750.83	$ 754.93	$ 709.03	$ 670.34	$ 705.8	$ 708.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64154	64156	64424	64426	64155	65774	54707	65776	54438	56057
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2133101031	Pkg1121102031	Pkg2133101031	Pkg1121101031	Pkg1331101031
GHGI [kg/m2]	14.77	13.17	14.67	13.06	14.57	14.65	13.78	13.05	13.72	13.77
% ICC	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	48.5	50.3	47.9	49.8	48.5	47.9	54.9	49.7	55.4	54.8
Output: MEUI [kWh/(m2 * yr)]	79.7	71.1	79.1	70.5	78.6	79	74.5	70.4	74.2	74.4
Output: Better than ERS (%)	2010.0%	2240.0%	2050.0%	2280.0%	2080.0%	2060.0%	1980.0%	2290.0%	2000.0%	1990.0%
Output: Better than Envelope (%)	830.0%	470.0%	940.0%	580.0%	830.0%	940.0%	380.0%	610.0%	490.0%	360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	636	627	638	630	636	638	607	630	604	607
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 89.61	$ 88.46	$ 89.96	$ 88.82	$ 89.61	$ 90.	$ 85.6	$ 88.86	$ 85.23	$ 85.64
Annual savings in carbon tax for electricity [$/year]	$ .32	$ .31	$ .32	$ .31	$ .32	$ .32	$ .3	$ .32	$ .3	$ .3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 89.92	$ 88.78	$ 90.28	$ 89.13	$ 89.92	$ 90.32	$ 85.9	$ 89.17	$ 85.54	$ 85.95
Annual savings in GHG from electricity savings [kg CO2e/year]	7	6.9	7	6.9	7	7	6.7	6.9	6.6	6.7
Annual savings in natural gas [m3/year]	40.24	47.56	40.73	48.06	41.16	40.81	44.77	48.11	45.05	44.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 372.85	$ 440.65	$ 377.34	$ 445.24	$ 381.35	$ 378.07	$ 414.8	$ 445.76	$ 417.39	$ 415.31
Annual savings in carbon tax for natural gas [$/year]	$ 93.06	$ 109.98	$ 94.18	$ 111.13	$ 95.18	$ 94.36	$ 103.53	$ 111.26	$ 104.18	$ 103.66
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 465.92	$ 550.64	$ 471.53	$ 556.37	$ 476.53	$ 472.43	$ 518.33	$ 557.02	$ 521.56	$ 518.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	2068.1	2444.1	2093	2469.6	2115.2	2097	2300.7	2472.4	2315.1	2303.6
Net Present Value [$]	$ 3,330.98	$ 4,905.12	$ 3,225.58	$ 4,802.33	$ 3,237.23	$ 3,149.83	$ 3,954.92	$ 4,721.49	$ 3,931.75	$ 3,873.84
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 023WWR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,326.22	$ 11,546.96	$ 10,052.22	$ 11,641.15	$ 10,272.96	$ 11,861.89	$ 11,876.22	$ 10,367.15	$ 10,602.22	$ 12,096.96
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 12,753.32	$ 13,001.88	$ 11,318.8	$ 13,107.93	$ 11,567.35	$ 13,356.49	$ 13,372.62	$ 11,673.41	$ 11,938.1	$ 13,621.18
Net Present Value [$]	$ 6,534.89	$ 6,631.84	$ 2,771.85	$ 6,708.87	$ 2,855.1	$ 6,821.88	$ 6,573.84	$ 2,948.01	$ 3,053.85	$ 6,687.04
Incremental dollars per GHG saving	$ 2.11	$ 2.15	$ 2.16	$ 2.17	$ 2.21	$ 2.21	$ 2.21	$ 2.23	$ 2.25	$ 2.25
Auxiliary Energy Required Heating [GJ/yr]	46.4	45.9	46.6	45.9	46.2	45.4	46.2	46.1	46.7	45.7
Annual Energy DHW [GJ/yr]	8.2	8.2	14.3	8.2	14.3	8.2	7.6	14.3	13	7.6
Annual Energy Space Heating [GJ/yr]	19	18.8	19.2	18.8	19	18.6	18.9	19	19.2	18.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	56.1	55.9	62.4	55.9	62.2	55.7	55.4	62.2	61.2	55.2
Design Heating Load [W]	10370.7	10280.8	10987.7	10306.4	10897.8	10216.5	10370.7	10923.5	10987.7	10280.8
Annual Energy Electricity [kWh/yr]	15574.9	15526.8	13362.9	15520.1	13309.5	15478.3	15376.4	13309	13363.9	15334.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,140.53	$ 2,133.73	$ 1,827.54	$ 2,132.78	$ 1,819.98	$ 2,126.86	$ 2,112.45	$ 1,819.91	$ 1,827.68	$ 2,106.53
Annual Energy Natural Gas [m3/yr]	0	0	382.7	0	382.7	0	0	382.7	350.4	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 165.08	$.	$ 165.08	$.	$.	$ 165.08	$ 151.15	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64168	64438	54445	65788	54715	66058	64169	56065	54446	64439
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg1121101031	Pkg2131101031	Pkg1121102031	Pkg2131102031	Pkg2121101031	Pkg1131101031	Pkg1121101031	Pkg2121102031
GHGI [kg/m2]	0.73	0.73	3.75	0.73	3.75	0.73	0.72	3.75	3.49	0.72
% ICC	2.2%	2.2%	1.9%	2.2%	2.0%	2.3%	2.3%	2.0%	2.0%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55	54.4	55.3	54.4	54.7	53.8	54.7	54.7	55.3	54.1
Output: MEUI [kWh/(m2 * yr)]	35.6	35.4	43.1	35.4	42.9	35.2	34.8	42.8	41.7	34.6
Output: Better than ERS (%)	4930.0%	4950.0%	4340.0%	4950.0%	4360.0%	4970.0%	5000.0%	4360.0%	4450.0%	5010.0%
Output: Better than Envelope (%)	400.0%	290.0%	450.0%	290.0%	360.0%	180.0%	360.0%	340.0%	470.0%	250.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7396	7348	5184	7342	5131	7300	7198	5130	5185	7156
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,042.89	$ 1,036.11	$ 731.	$ 1,035.17	$ 723.47	$ 1,029.27	$ 1,014.9	$ 723.4	$ 731.14	$ 1,009.01
Annual savings in carbon tax for electricity [$/year]	$ 3.7	$ 3.67	$ 2.59	$ 3.67	$ 2.57	$ 3.65	$ 3.6	$ 2.57	$ 2.59	$ 3.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,046.59	$ 1,039.78	$ 733.59	$ 1,038.84	$ 726.04	$ 1,032.92	$ 1,018.5	$ 725.97	$ 733.73	$ 1,012.59
Annual savings in GHG from electricity savings [kg CO2e/year]	81.4	80.8	57	80.8	56.4	80.3	79.2	56.4	57	78.7
Annual savings in natural gas [m3/year]	106.01	106.01	91.75	106.01	91.75	106.01	106.01	91.75	92.96	106.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 982.21	$ 982.21	$ 850.1	$ 982.21	$ 850.1	$ 982.21	$ 982.21	$ 850.1	$ 861.25	$ 982.21
Annual savings in carbon tax for natural gas [$/year]	$ 245.15	$ 245.15	$ 212.18	$ 245.15	$ 212.18	$ 245.15	$ 245.15	$ 212.18	$ 214.96	$ 245.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,227.36	$ 1,227.36	$ 1,062.28	$ 1,227.36	$ 1,062.28	$ 1,227.36	$ 1,227.36	$ 1,062.28	$ 1,076.21	$ 1,227.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	5447.9	5447.9	4715.1	5447.9	4715.1	5447.9	5447.9	4715.1	4777	5447.9
Net Present Value [$]	$ 6,534.89	$ 6,631.84	$ 2,771.85	$ 6,708.87	$ 2,855.1	$ 6,821.88	$ 6,573.84	$ 2,948.01	$ 3,053.85	$ 6,687.04
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.

MEDIUM 023WWR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 7,402.22	$ 7,622.96	$ 7,717.15	$ 7,952.22	$ 7,937.89	$ 8,172.96	$ 8,252.22	$ 8,267.15	$ 8,765.18	$ 8,472.96
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 8,334.9	$ 8,583.45	$ 8,689.51	$ 8,954.2	$ 8,938.06	$ 9,202.75	$ 9,292.	$ 9,308.81	$ 9,869.59	$ 9,540.55
Net Present Value [$]	$ 4,905.12	$ 4,802.33	$ 4,721.49	$ 4,623.79	$ 4,617.79	$ 4,520.09	$ 4,498.01	$ 4,439.98	$ 4,405.65	$ 4,394.31
Incremental dollars per GHG saving	$ 3.02	$ 3.08	$ 3.11	$ 3.17	$ 3.17	$ 3.22	$ 3.23	$ 3.25	$ 3.32	$ 3.29
Auxiliary Energy Required Heating [GJ/yr]	42.5	42	41.9	42.5	41.5	42	42.5	41.9	39	42
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	13	12.3	13	14.3	12.3
Annual Energy Space Heating [GJ/yr]	45	44.5	44.4	45	43.9	44.5	45	44.4	41.3	44.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	85.6	85.1	85	84.4	84.5	83.9	83.6	83.8	81.9	83.1
Design Heating Load [W]	10006.1	9916.2	9941.8	10006.1	9851.9	9916.2	10006.1	9941.8	9555.5	9916.2
Annual Energy Electricity [kWh/yr]	7551.1	7548.6	7548.3	7551.2	7545.8	7548.7	7551.2	7548.4	7532.7	7548.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,005.17	$ 1,004.81	$ 1,004.77	$ 1,005.18	$ 1,004.42	$ 1,004.83	$ 1,005.18	$ 1,004.78	$ 1,002.56	$ 1,004.83
Annual Energy Natural Gas [m3/yr]	1568.8	1555.5	1554	1536.7	1540.8	1523.5	1515.9	1521.9	1471.4	1502.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 676.73	$ 670.99	$ 670.34	$ 662.88	$ 664.65	$ 657.18	$ 653.91	$ 656.49	$ 634.71	$ 648.21
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64156	64426	65776	64157	66046	64427	64158	65777	70528	64428
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2221101031	Pkg2121102031
GHGI [kg/m2]	13.17	13.06	13.05	12.91	12.94	12.8	12.74	12.79	12.37	12.63
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.7%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	50.3	49.8	49.7	50.3	49.1	49.8	50.3	49.7	46.2	49.8
Output: MEUI [kWh/(m2 * yr)]	71.1	70.5	70.4	69.7	69.8	69.1	68.7	69	66.7	68.2
Output: Better than ERS (%)	2240.0%	2280.0%	2290.0%	2350.0%	2340.0%	2390.0%	2420.0%	2400.0%	2570.0%	2470.0%
Output: Better than Envelope (%)	470.0%	580.0%	610.0%	470.0%	700.0%	580.0%	470.0%	610.0%	1260.0%	580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	627	630	630	627	633	630	627	630	646	630
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 88.46	$ 88.82	$ 88.86	$ 88.45	$ 89.21	$ 88.8	$ 88.45	$ 88.84	$ 91.06	$ 88.8
Annual savings in carbon tax for electricity [$/year]	$ .31	$ .31	$ .32	$ .31	$ .32	$ .31	$ .31	$ .32	$ .32	$ .31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 88.78	$ 89.13	$ 89.17	$ 88.76	$ 89.53	$ 89.12	$ 88.76	$ 89.16	$ 91.38	$ 89.12
Annual savings in GHG from electricity savings [kg CO2e/year]	6.9	6.9	6.9	6.9	7	6.9	6.9	6.9	7.1	6.9
Annual savings in natural gas [m3/year]	47.56	48.06	48.11	48.76	48.6	49.25	49.53	49.31	51.19	50.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 440.65	$ 445.24	$ 445.76	$ 451.73	$ 450.32	$ 456.29	$ 458.91	$ 456.84	$ 474.28	$ 463.47
Annual savings in carbon tax for natural gas [$/year]	$ 109.98	$ 111.13	$ 111.26	$ 112.75	$ 112.4	$ 113.89	$ 114.54	$ 114.03	$ 118.38	$ 115.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 550.64	$ 556.37	$ 557.02	$ 564.48	$ 562.72	$ 570.18	$ 573.46	$ 570.87	$ 592.65	$ 579.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	2444.1	2469.6	2472.4	2505.6	2497.7	2530.8	2545.4	2533.9	2630.6	2570.7
Net Present Value [$]	$ 4,905.12	$ 4,802.33	$ 4,721.49	$ 4,623.79	$ 4,617.79	$ 4,520.09	$ 4,498.01	$ 4,439.98	$ 4,405.65	$ 4,394.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.

MEDIUM 023WWR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75
Total increase in construction cost [$]	$ 11,315.18	$ 11,532.96	$ 11,535.92	$ 11,627.15	$ 11,630.11	$ 11,752.22	$ 11,847.89	$ 11,850.85	$ 11,865.18	$ 11,972.96
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 12,740.89	$ 12,986.11	$ 12,989.45	$ 13,092.17	$ 13,095.5	$ 13,233.	$ 13,340.72	$ 13,344.06	$ 13,360.19	$ 13,481.55
Net Present Value [$]	$ 3,923.41	$ 5,272.12	$ 4,022.55	$ 5,349.04	$ 4,099.83	$ 5,164.43	$ 5,435.58	$ 4,198.24	$ 4,155.79	$ 5,261.56
Incremental dollars per GHG saving	$ 2.74	$ 2.79	$ 2.79	$ 2.81	$ 2.81	$ 2.84	$ 2.87	$ 2.86	$ 2.82	$ 2.9
Auxiliary Energy Required Heating [GJ/yr]	37.4	38.8	36.9	38.8	36.9	37.7	38.3	36.4	37.4	37.2
Annual Energy DHW [GJ/yr]	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	23.2	24.6
Annual Energy Space Heating [GJ/yr]	15.6	16.2	15.5	16.2	15.4	15.7	16	15.3	15.6	15.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	1.7	0.8	1.7	0.8	1.7	1.7	0.8	0.8	1.7
Total Energy [GJ/yr]	69.3	70.9	69.1	70.8	69.1	70.4	70.7	68.9	67.9	70.3
Design Heating Load [W]	9920.1	9586.8	9830.2	9612.5	9855.8	9500.1	9522.6	9765.9	9920.1	9410.2
Annual Energy Electricity [kWh/yr]	12415.1	12854.1	12367.6	12848.7	12362.3	12726.7	12796.6	12314.8	12415.1	12678.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,693.42	$ 1,755.54	$ 1,686.7	$ 1,754.78	$ 1,685.95	$ 1,737.51	$ 1,747.4	$ 1,679.23	$ 1,693.42	$ 1,730.72
Annual Energy Natural Gas [m3/yr]	660.7	660.8	660.8	660.4	660.4	660.9	660.4	660.4	622.8	660.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.	$ 285.05	$ 285.05	$ 284.87	$ 284.87	$ 285.09	$ 284.87	$ 284.87	$ 268.65	$ 285.09
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70534	64450	70804	65800	73666	64198	66070	73936	70535	64468
Upgrade Package List	Pkg2221101031	Pkg2121102032	Pkg2221102031	Pkg2131101032	Pkg2231101031	Pkg2121101033	Pkg2131102032	Pkg2231102031	Pkg2221101031	Pkg2121102033
GHGI [kg/m2]	5.98	6	5.98	6	5.97	6	6	5.97	5.67	5.99
% ICC	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	44.3	46	43.8	46	43.7	44.6	45.4	43.2	44.3	44.1
Output: MEUI [kWh/(m2 * yr)]	51.3	53.1	51.1	53.1	51	52.6	52.9	50.8	49.6	52.4
Output: Better than ERS (%)	4040.0%	3900.0%	4060.0%	3910.0%	4060.0%	3950.0%	3920.0%	4080.0%	4160.0%	3960.0%
Output: Better than Envelope (%)	1610.0%	1300.0%	1730.0%	1300.0%	1730.0%	1550.0%	1410.0%	1840.0%	1610.0%	1660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4237	4676	4189	4670	4184	4548	4618	4136	4237	4500
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 597.36	$ 659.26	$ 590.66	$ 658.5	$ 589.92	$ 641.3	$ 651.15	$ 583.22	$ 597.36	$ 634.53
Annual savings in carbon tax for electricity [$/year]	$ 2.12	$ 2.34	$ 2.09	$ 2.34	$ 2.09	$ 2.27	$ 2.31	$ 2.07	$ 2.12	$ 2.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 599.48	$ 661.6	$ 592.76	$ 660.83	$ 592.01	$ 643.57	$ 653.46	$ 585.29	$ 599.48	$ 636.78
Annual savings in GHG from electricity savings [kg CO2e/year]	46.6	51.4	46.1	51.4	46	50	50.8	45.5	46.6	49.5
Annual savings in natural gas [m3/year]	81.4	81.39	81.39	81.41	81.41	81.39	81.41	81.41	82.81	81.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 754.13	$ 754.1	$ 754.1	$ 754.24	$ 754.24	$ 754.06	$ 754.24	$ 754.24	$ 767.22	$ 754.06
Annual savings in carbon tax for natural gas [$/year]	$ 188.23	$ 188.22	$ 188.22	$ 188.25	$ 188.25	$ 188.21	$ 188.25	$ 188.25	$ 191.49	$ 188.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 942.36	$ 942.32	$ 942.32	$ 942.49	$ 942.49	$ 942.27	$ 942.49	$ 942.49	$ 958.71	$ 942.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	4182.8	4182.7	4182.7	4183.4	4183.4	4182.5	4183.4	4183.4	4255.4	4182.5
Net Present Value [$]	$ 3,923.41	$ 5,272.12	$ 4,022.55	$ 5,349.04	$ 4,099.83	$ 5,164.43	$ 5,435.58	$ 4,198.24	$ 4,155.79	$ 5,261.56
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	3.87	5.28	3.87	5.28	3.87	3.87	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 60	NA	HRV sre 60	NA	HRV sre 75	HRV sre 60	NA	NA	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 023WWR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,135.92	$ 12,230.11	$ 12,450.85	$ 12,685.92	$ 12,572.96	$ 12,780.11	$ 12,667.15	$ 12,985.92	$ 11,315.18	$ 13,080.11
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,665.05	$ 13,771.1	$ 14,019.66	$ 14,284.35	$ 14,157.15	$ 14,390.4	$ 14,263.21	$ 14,622.15	$ 12,740.89	$ 14,728.2
Net Present Value [$]	$ 2,565.02	$ 2,656.47	$ 2,743.37	$ 2,847.02	$ 3,821.32	$ 2,938.48	$ 3,893.78	$ 2,972.75	$ 3,923.41	$ 3,064.02
Incremental dollars per GHG saving	$ 2.6	$ 2.62	$ 2.67	$ 2.68	$ 2.7	$ 2.7	$ 2.72	$ 2.72	$ 2.74	$ 2.74
Auxiliary Energy Required Heating [GJ/yr]	38.4	38.4	37.9	38.4	38.6	38.4	38.6	38.4	37.4	38.4
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	13	14.3	12.3	24.6	12.3
Annual Energy Space Heating [GJ/yr]	15.9	15.9	15.8	16	16.1	15.9	16	16	15.6	15.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	1.7	0.8	1.7	0.8	0.8	0.8
Total Energy [GJ/yr]	59.2	59.2	59	58	60.3	58	60.3	57.2	69.3	57.2
Design Heating Load [W]	9543.1	9568.7	9478.8	9543.1	9123.1	9568.7	9148.7	9543.1	9920.1	9568.7
Annual Energy Electricity [kWh/yr]	12473.2	12472.1	12420.1	12474.2	12791.4	12473.1	12783	12474.8	12415.1	12473.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,701.64	$ 1,701.49	$ 1,694.13	$ 1,701.78	$ 1,746.67	$ 1,701.63	$ 1,745.48	$ 1,701.87	$ 1,693.42	$ 1,701.71
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	382.7	350.4	382.7	329.4	660.7	329.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 285.	$ 142.09
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70807	73669	73939	70808	64471	73670	65821	70809	70534	73671
Upgrade Package List	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2121102033	Pkg2231101031	Pkg2131101033	Pkg2221102031	Pkg2221101031	Pkg2231101031
GHGI [kg/m2]	3.71	3.71	3.71	3.45	3.73	3.45	3.73	3.28	5.98	3.28
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.2%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.5	45.5	44.9	45.5	45.8	45.5	45.7	45.5	44.3	45.5
Output: MEUI [kWh/(m2 * yr)]	39.3	39.3	39	37.8	40.6	37.8	40.6	36.9	51.3	36.9
Output: Better than ERS (%)	4630.0%	4630.0%	4650.0%	4740.0%	4530.0%	4740.0%	4530.0%	4810.0%	4040.0%	4810.0%
Output: Better than Envelope (%)	1390.0%	1390.0%	1500.0%	1390.0%	1350.0%	1390.0%	1350.0%	1390.0%	1610.0%	1390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4295	4294	4242	4296	4613	4295	4604	4296	4237	4295
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 605.55	$ 605.4	$ 598.07	$ 605.69	$ 650.42	$ 605.54	$ 649.23	$ 605.78	$ 597.36	$ 605.62
Annual savings in carbon tax for electricity [$/year]	$ 2.15	$ 2.15	$ 2.12	$ 2.15	$ 2.31	$ 2.15	$ 2.3	$ 2.15	$ 2.12	$ 2.15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 607.7	$ 607.54	$ 600.19	$ 607.84	$ 652.73	$ 607.69	$ 651.54	$ 607.93	$ 599.48	$ 607.77
Annual savings in GHG from electricity savings [kg CO2e/year]	47.2	47.2	46.7	47.3	50.7	47.2	50.6	47.3	46.6	47.2
Annual savings in natural gas [m3/year]	91.75	91.75	91.75	92.96	91.75	92.96	91.75	93.74	81.4	93.74
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 850.1	$ 850.1	$ 850.1	$ 861.25	$ 850.1	$ 861.25	$ 850.1	$ 868.5	$ 754.13	$ 868.5
Annual savings in carbon tax for natural gas [$/year]	$ 212.18	$ 212.18	$ 212.18	$ 214.96	$ 212.18	$ 214.96	$ 212.18	$ 216.77	$ 188.23	$ 216.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,062.28	$ 1,062.28	$ 1,062.28	$ 1,076.21	$ 1,062.28	$ 1,076.21	$ 1,062.28	$ 1,085.27	$ 942.36	$ 1,085.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	4715.1	4715.1	4715.1	4777	4715.1	4777	4715.1	4817.2	4182.8	4817.2
Net Present Value [$]	$ 2,565.02	$ 2,656.47	$ 2,743.37	$ 2,847.02	$ 3,821.32	$ 2,938.48	$ 3,893.78	$ 2,972.75	$ 3,923.41	$ 3,064.02
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	10.51	8.78	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	5.28	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 75	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$.	$ 850.

MEDIUM 023WWR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,701.27	$ 14,780.53	$ 14,816.2	$ 14,795.46	$ 15,001.27	$ 15,016.2	$ 15,095.46	$ 15,316.2	$ 15,138.02	$ 15,152.95
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 16,553.63	$ 16,642.88	$ 16,683.04	$ 16,659.69	$ 16,891.43	$ 16,908.24	$ 16,997.49	$ 17,246.04	$ 17,045.41	$ 17,062.22
Net Present Value [$]	$ 304.74	$ 286.3	$ 232.01	$ 219.41	$ 179.02	$ 111.15	$ 93.63	$ 14.63	$ 64.27	$ 131.71
Incremental dollars per GHG saving	$ 4.62	$ 4.62	$ 4.64	$ 4.65	$ 4.66	$ 4.68	$ 4.68	$ 4.72	$ 4.73	$ 4.76
Auxiliary Energy Required Heating [GJ/yr]	29.9	30.4	30.4	29.9	29.9	29.4	29.9	29.4	30.3	29.8
Annual Energy DHW [GJ/yr]	13	12.3	12.3	13	12.3	13	12.3	12.3	12.3	13
Annual Energy Space Heating [GJ/yr]	31.7	32.2	32.2	31.6	31.7	31.2	31.6	31.2	32.1	31.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	72.1	71.8	71.8	72	71.3	71.5	71.2	70.8	71.7	72
Design Heating Load [W]	7800	7889.9	7773.6	7825.7	7800	7735.8	7825.7	7735.8	7785	7720.7
Annual Energy Electricity [kWh/yr]	7749.6	7752.1	7752.5	7749.5	7749.7	7747.1	7749.5	7747.1	7752	7749.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,033.25	$ 1,033.61	$ 1,033.66	$ 1,033.24	$ 1,033.27	$ 1,032.9	$ 1,033.24	$ 1,032.9	$ 1,033.59	$ 1,033.21
Annual Energy Natural Gas [m3/yr]	1185.6	1177.6	1179.7	1184.6	1164.8	1171.9	1163.8	1151.1	1176.8	1183.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 511.43	$ 507.98	$ 508.88	$ 511.	$ 502.45	$ 505.52	$ 502.02	$ 496.54	$ 507.63	$ 510.69
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96377	96162	98304	98105	96378	98321	98106	98322	96576	98519
Upgrade Package List	Pkg3321202034	Pkg3321201034	Pkg3331202033	Pkg3331201034	Pkg3321202034	Pkg3331202034	Pkg3331201034	Pkg3331202034	Pkg3321203033	Pkg3331203033
GHGI [kg/m2]	10.05	9.98	10	10.04	9.88	9.94	9.87	9.77	9.98	10.03
% ICC	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	35.4	36	36.1	35.4	35.4	34.9	35.4	34.9	36	35.4
Output: MEUI [kWh/(m2 * yr)]	55	54.7	54.8	55	54.1	54.4	54.1	53.5	54.6	54.9
Output: Better than ERS (%)	3460.0%	3490.0%	3490.0%	3470.0%	3540.0%	3520.0%	3540.0%	3580.0%	3500.0%	3470.0%
Output: Better than Envelope (%)	3300.0%	3180.0%	3180.0%	3300.0%	3300.0%	3410.0%	3300.0%	3410.0%	3210.0%	3320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	429	426	426	429	429	431	429	431	426	429
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 60.47	$ 60.12	$ 60.07	$ 60.49	$ 60.46	$ 60.83	$ 60.49	$ 60.83	$ 60.14	$ 60.52
Annual savings in carbon tax for electricity [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .22	$ .21	$ .22	$ .21	$ .21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 60.69	$ 60.34	$ 60.28	$ 60.7	$ 60.68	$ 61.04	$ 60.7	$ 61.04	$ 60.35	$ 60.73
Annual savings in GHG from electricity savings [kg CO2e/year]	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Annual savings in natural gas [m3/year]	61.84	62.14	62.06	61.88	62.61	62.35	62.65	63.12	62.17	61.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 572.93	$ 575.7	$ 574.97	$ 573.28	$ 580.12	$ 577.66	$ 580.46	$ 584.84	$ 575.97	$ 573.52
Annual savings in carbon tax for natural gas [$/year]	$ 143.	$ 143.69	$ 143.51	$ 143.09	$ 144.79	$ 144.18	$ 144.88	$ 145.97	$ 143.76	$ 143.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 715.94	$ 719.39	$ 718.48	$ 716.37	$ 724.91	$ 721.85	$ 725.34	$ 730.82	$ 719.73	$ 716.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	3177.8	3193.1	3189.1	3179.7	3217.6	3204	3219.6	3243.9	3194.7	3181.1
Net Present Value [$]	$ 304.74	$ 286.3	$ 232.01	$ 219.41	$ 179.02	$ 111.15	$ 93.63	$ 14.63	$ 64.27	$ 131.71
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	10.51	10.51	8.78	10.51	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 550.

MEDIUM 023WWR Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,886.63	$ 24,980.82	$ 25,134.53	$ 25,165.89	$ 25,186.63	$ 25,201.56	$ 25,280.82	$ 25,347.51	$ 25,355.27	$ 25,386.63
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 28,022.35	$ 28,128.4	$ 28,301.48	$ 28,336.79	$ 28,360.15	$ 28,376.96	$ 28,466.2	$ 28,541.3	$ 28,550.03	$ 28,585.35
Net Present Value [$]	$ 14,295.59	$ 14,355.9	$ 14,442.34	$ 14,433.04	$ 14,389.59	$ 14,481.02	$ 14,449.89	$ 14,756.47	$ 14,566.31	$ 14,547.88
Incremental dollars per GHG saving	$ 5.9	$ 5.92	$ 5.96	$ 5.96	$ 5.9	$ 5.97	$ 5.92	$ 6.01	$ 6.01	$ 6.02
Auxiliary Energy Required Heating [GJ/yr]	24.3	24.3	24.1	23.8	24.3	23.9	24.3	24.3	23.6	23.4
Annual Energy DHW [GJ/yr]	23.2	23.2	23.2	23.2	22.3	23.2	22.3	23.2	23.2	23.2
Annual Energy Space Heating [GJ/yr]	10.5	10.5	10.4	10.3	10.5	10.3	10.5	10.5	10.2	10.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	63.9	63.8	63.7	63.7	63	63.7	62.9	63.9	63.6	63.5
Design Heating Load [W]	7497	7522.7	7453.8	7549.1	7497	7432.7	7522.7	7497	7363.9	7459.1
Annual Energy Electricity [kWh/yr]	11292.2	11280.6	11252.9	11236.7	11292.2	11243.1	11280.6	11292.2	11215.3	11195.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,534.53	$ 1,532.89	$ 1,528.97	$ 1,526.68	$ 1,534.53	$ 1,527.58	$ 1,532.89	$ 1,534.53	$ 1,523.65	$ 1,520.82
Annual Energy Natural Gas [m3/yr]	623.9	623.4	623.9	624	599.3	623.5	598.8	623.9	623.9	624.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 269.13	$ 268.91	$ 269.13	$ 269.17	$ 258.52	$ 268.96	$ 258.3	$ 269.13	$ 269.13	$ 269.21
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	88697	90425	96239	88499	88698	90641	90426	89345	96455	88715
Upgrade Package List	Pkg3221202053	Pkg3231201053	Pkg3321201052	Pkg3221201054	Pkg3221202053	Pkg3231202053	Pkg3231201053	Pkg3221302053	Pkg3321202052	Pkg3221202054
GHGI [kg/m2]	5.63	5.62	5.62	5.62	5.43	5.62	5.42	5.63	5.62	5.62
% ICC	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.9%	4.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	28.8	28.8	28.5	28.2	28.8	28.3	28.8	28.8	28	27.7
Output: MEUI [kWh/(m2 * yr)]	44.9	44.8	44.7	44.6	43.8	44.6	43.7	44.9	44.5	44.5
Output: Better than ERS (%)	4510.0%	4510.0%	4520.0%	4520.0%	4580.0%	4520.0%	4590.0%	4510.0%	4530.0%	4540.0%
Output: Better than Envelope (%)	4550.0%	4550.0%	4600.0%	4660.0%	4550.0%	4640.0%	4550.0%	4550.0%	4710.0%	4750.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3114	3102	3074	3058	3114	3065	3102	3114	3037	3017
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 439.03	$ 437.4	$ 433.49	$ 431.21	$ 439.03	$ 432.11	$ 437.4	$ 439.03	$ 428.19	$ 425.37
Annual savings in carbon tax for electricity [$/year]	$ 1.56	$ 1.55	$ 1.54	$ 1.53	$ 1.56	$ 1.53	$ 1.55	$ 1.56	$ 1.52	$ 1.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 440.59	$ 438.95	$ 435.03	$ 432.74	$ 440.59	$ 433.64	$ 438.95	$ 440.59	$ 429.71	$ 426.88
Annual savings in GHG from electricity savings [kg CO2e/year]	34.3	34.1	33.8	33.6	34.3	33.7	34.1	34.3	33.4	33.2
Annual savings in natural gas [m3/year]	82.77	82.79	82.77	82.76	83.68	82.78	83.7	82.77	82.77	82.76
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 766.84	$ 767.01	$ 766.84	$ 766.8	$ 775.33	$ 766.97	$ 775.5	$ 766.84	$ 766.84	$ 766.77
Annual savings in carbon tax for natural gas [$/year]	$ 191.4	$ 191.44	$ 191.4	$ 191.39	$ 193.52	$ 191.43	$ 193.56	$ 191.4	$ 191.4	$ 191.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 958.23	$ 958.45	$ 958.23	$ 958.19	$ 968.85	$ 958.41	$ 969.06	$ 958.23	$ 958.23	$ 958.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	4253.3	4254.3	4253.3	4253.1	4300.4	4254.1	4301.4	4253.3	4253.3	4252.9
Net Present Value [$]	$ 14,295.59	$ 14,355.9	$ 14,442.34	$ 14,433.04	$ 14,389.59	$ 14,481.02	$ 14,449.89	$ 14,756.47	$ 14,566.31	$ 14,547.88
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	5.28	5.28	5.28	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.	$ 550.

MEDIUM 023WWR Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 28,580.15	$ 28,876.43	$ 28,895.08	$ 29,031.83	$ 29,130.15	$ 29,137.47	$ 29,191.36	$ 29,216.9	$ 29,245.08	$ 29,266.9
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 32,181.25	$ 32,514.86	$ 32,535.86	$ 32,689.84	$ 32,800.55	$ 32,808.79	$ 32,869.47	$ 32,898.23	$ 32,929.96	$ 32,954.53
Net Present Value [$]	$ 18,469.03	$ 18,765.31	$ 18,655.24	$ 18,910.12	$ 18,514.36	$ 19,062.13	$ 18,951.52	$ 18,968.29	$ 18,427.72	$ 18,770.34
Incremental dollars per GHG saving	$ 5.3	$ 5.36	$ 5.36	$ 5.39	$ 5.4	$ 5.41	$ 5.42	$ 5.42	$ 5.42	$ 5.43
Auxiliary Energy Required Heating [GJ/yr]	24.3	24.3	23.8	24.2	24.1	24.5	23.8	23.7	24.4	24.5
Annual Energy DHW [GJ/yr]	8.3	8.3	8.3	8.3	7.6	8.2	8.3	8.3	7.2	7.6
Annual Energy Space Heating [GJ/yr]	10.4	10.4	10.2	10.4	10.3	10.4	10.2	10.2	10.4	10.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	48.6	48.6	48.5	48.6	47.9	48.7	48.5	48.4	47.6	48.1
Design Heating Load [W]	6760.8	6760.8	6696.6	6681.5	6760.8	6689.6	6696.6	6707.9	6734.4	6745.8
Annual Energy Electricity [kWh/yr]	13508.5	13508.5	13458.5	13504.4	13312.5	13522.4	13458.5	13455.1	13234.2	13358.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,848.14	$ 1,848.14	$ 1,841.06	$ 1,847.56	$ 1,820.4	$ 1,850.1	$ 1,841.06	$ 1,840.58	$ 1,809.32	$ 1,826.96
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	103786	104074	104362	104488	103787	104920	104650	103930	104346	103913
Upgrade Package List	Pkg4321302054	Pkg4321402054	Pkg4331302054	Pkg4331303053	Pkg4321302054	Pkg4341302053	Pkg4331402054	Pkg4321303054	Pkg4331302053	Pkg4321303053
GHGI [kg/m2]	0.63	0.63	0.63	0.63	0.62	0.63	0.63	0.63	0.62	0.63
% ICC	5.5%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.8	28.8	28.2	28.7	28.5	29	28.2	28.1	29	29
Output: MEUI [kWh/(m2 * yr)]	26.8	26.8	26.6	26.8	26	26.9	26.6	26.6	25.6	26.2
Output: Better than ERS (%)	5610.0%	5610.0%	5620.0%	5610.0%	5670.0%	5600.0%	5620.0%	5630.0%	5700.0%	5650.0%
Output: Better than Envelope (%)	4550.0%	4550.0%	4660.0%	4570.0%	4600.0%	4510.0%	4660.0%	4690.0%	4530.0%	4510.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5330	5330	5280	5326	5134	5344	5280	5277	5056	5180
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 751.53	$ 751.53	$ 744.48	$ 750.95	$ 723.89	$ 753.49	$ 744.48	$ 744.	$ 712.85	$ 730.42
Annual savings in carbon tax for electricity [$/year]	$ 2.66	$ 2.66	$ 2.64	$ 2.66	$ 2.57	$ 2.67	$ 2.64	$ 2.64	$ 2.53	$ 2.59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 754.2	$ 754.2	$ 747.12	$ 753.61	$ 726.46	$ 756.16	$ 747.12	$ 746.64	$ 715.38	$ 733.01
Annual savings in GHG from electricity savings [kg CO2e/year]	58.6	58.6	58.1	58.6	56.5	58.8	58.1	58	55.6	57
Annual savings in natural gas [m3/year]	106.01	106.01	106.01	106.01	106.01	106.01	106.01	106.01	106.01	106.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21	$ 982.21
Annual savings in carbon tax for natural gas [$/year]	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15	$ 245.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36	$ 1,227.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	5447.9	5447.9	5447.9	5447.9	5447.9	5447.9	5447.9	5447.9	5447.9	5447.9
Net Present Value [$]	$ 18,469.03	$ 18,765.31	$ 18,655.24	$ 18,910.12	$ 18,514.36	$ 19,062.13	$ 18,951.52	$ 18,968.29	$ 18,427.72	$ 18,770.34
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	14.09	10.51	10.51	10.51	14.09	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.

MEDIUM 023WWR Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k	Medium 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 26,916.9	$ 27,231.83	$ 25,624.53	$ 27,213.18	$ 25,845.27	$ 27,337.47	$ 25,751.56	$ 25,720.2	$ 25,939.46	$ 27,528.11
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 30,308.43	$ 30,663.04	$ 28,853.22	$ 30,642.04	$ 29,101.77	$ 30,781.99	$ 28,996.26	$ 28,960.95	$ 29,207.83	$ 30,996.65
Net Present Value [$]	$ 12,542.66	$ 12,740.3	$ 12,813.47	$ 12,838.94	$ 12,884.86	$ 12,906.3	$ 12,950.73	$ 13,000.07	$ 13,001.51	$ 13,036.58
Incremental dollars per GHG saving	$ 6.44	$ 6.48	$ 5.47	$ 6.51	$ 5.52	$ 6.53	$ 5.5	$ 5.49	$ 5.54	$ 6.55
Auxiliary Energy Required Heating [GJ/yr]	23.4	22.9	23.9	23.4	23.4	23.2	24.2	24.5	23.4	22.9
Annual Energy DHW [GJ/yr]	7.2	7.2	14.3	7.2	14.3	7.2	14.3	14.3	14.3	7.2
Annual Energy Space Heating [GJ/yr]	24.8	24.3	10.2	24.8	10	24.6	10.3	10.5	10	24.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	59.4	58.9	54.6	59.4	54.4	59.1	54.6	54.8	54.4	58.9
Design Heating Load [W]	6636	6571.8	7001.3	6636	6911.4	6579.9	7119.1	7023.8	6937.1	6571.8
Annual Energy Electricity [kWh/yr]	9725	9721.4	11214.6	9725	11156.6	9721.5	11218.6	11249.9	11165.3	9721.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,312.77	$ 1,312.26	$ 1,523.55	$ 1,312.77	$ 1,515.34	$ 1,312.28	$ 1,524.12	$ 1,528.55	$ 1,516.57	$ 1,312.26
Annual Energy Natural Gas [m3/yr]	653.9	641	382.7	653.9	382.7	648.2	382.7	382.7	382.7	641
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 282.07	$ 276.51	$ 165.08	$ 282.07	$ 165.08	$ 279.61	$ 165.08	$ 165.08	$ 165.08	$ 276.51
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	103923	104499	96259	104211	96475	104931	90661	98401	98203	104787
Upgrade Package List	Pkg4321303054	Pkg4331303054	Pkg3321201053	Pkg4321403054	Pkg3321202053	Pkg4341302054	Pkg3231202054	Pkg3331202052	Pkg3331201053	Pkg4331403054
GHGI [kg/m2]	5.8	5.69	3.65	5.8	3.65	5.75	3.65	3.65	3.65	5.69
% ICC	5.1%	5.2%	4.9%	5.2%	4.9%	5.2%	4.9%	4.9%	5.0%	5.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	27.7	27.2	28.3	27.7	27.8	27.5	28.6	29	27.7	27.2
Output: MEUI [kWh/(m2 * yr)]	40	39.4	33.9	40	33.7	39.7	33.9	34	33.7	39.4
Output: Better than ERS (%)	4640.0%	4690.0%	5050.0%	4640.0%	5060.0%	4670.0%	5050.0%	5030.0%	5060.0%	4690.0%
Output: Better than Envelope (%)	4750.0%	4870.0%	4640.0%	4750.0%	4750.0%	4800.0%	4570.0%	4510.0%	4750.0%	4870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1546	1543	3036	1546	2978	1543	3040	3071	2987	1543
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 218.06	$ 217.55	$ 428.09	$ 218.06	$ 419.91	$ 217.56	$ 428.65	$ 433.07	$ 421.14	$ 217.55
Annual savings in carbon tax for electricity [$/year]	$ .77	$ .77	$ 1.52	$ .77	$ 1.49	$ .77	$ 1.52	$ 1.54	$ 1.49	$ .77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 218.83	$ 218.32	$ 429.61	$ 218.83	$ 421.4	$ 218.33	$ 430.17	$ 434.6	$ 422.63	$ 218.32
Annual savings in GHG from electricity savings [kg CO2e/year]	17	17	33.4	17	32.8	17	33.4	33.8	32.9	17
Annual savings in natural gas [m3/year]	81.65	82.13	91.75	81.65	91.75	81.86	91.75	91.75	91.75	82.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 756.48	$ 760.93	$ 850.1	$ 756.48	$ 850.1	$ 758.45	$ 850.1	$ 850.1	$ 850.1	$ 760.93
Annual savings in carbon tax for natural gas [$/year]	$ 188.81	$ 189.93	$ 212.18	$ 188.81	$ 212.18	$ 189.3	$ 212.18	$ 212.18	$ 212.18	$ 189.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 945.29	$ 950.86	$ 1,062.28	$ 945.29	$ 1,062.28	$ 947.75	$ 1,062.28	$ 1,062.28	$ 1,062.28	$ 950.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	4195.9	4220.6	4715.1	4195.9	4715.1	4206.8	4715.1	4715.1	4715.1	4220.6
Net Present Value [$]	$ 12,542.66	$ 12,740.3	$ 12,813.47	$ 12,838.94	$ 12,884.86	$ 12,906.3	$ 12,950.73	$ 13,000.07	$ 13,001.51	$ 13,036.58
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	8.78	14.09	10.51	10.51	10.51	10.51	8.78	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR50	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 1,286.55	$ 544.16	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 2,213.87	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 2,213.87
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	NA	DWHR eff 55	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$ 3,150.	$.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$.	$ 850.	$.	$ 850.	$.	$.	$.	$ 850.

MEDIUM 023WWR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,802.22	$ 7,022.96	$ 7,117.15	$ 7,337.89	$ 7,352.22	$ 7,402.22	$ 7,572.96	$ 7,622.96	$ 7,652.22	$ 7,667.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,216.93	$ 10,548.49	$ 10,689.96	$ 11,021.51	$ 11,043.03	$ 11,118.13	$ 11,374.59	$ 11,449.69	$ 11,493.63	$ 11,516.06
Net Present Value [$]	$ 6,299.93	$ 6,231.48	$ 6,156.46	$ 6,088.43	$ 6,130.88	$ 7,817.2	$ 6,062.67	$ 7,751.6	$ 6,082.99	$ 5,987.65
Incremental dollars per GHG saving	$ 2.63	$ 2.68	$ 2.71	$ 2.76	$ 2.75	$ 2.41	$ 2.79	$ 2.45	$ 2.8	$ 2.83
Auxiliary Energy Required Heating [GJ/yr]	59.8	59.2	59.2	58.6	59.8	61	59.2	60.4	59.8	59.2
Annual Energy DHW [GJ/yr]	26.5	26.5	26.5	26.5	24.8	15.8	24.8	15.8	23.7	24.8
Annual Energy Space Heating [GJ/yr]	63.4	62.7	62.7	62	63.4	64.6	62.7	64	63.4	62.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	116.3	115.6	115.5	114.9	114.6	106.8	113.9	106.1	113.5	113.8
Design Heating Load [W]	12589.5	12482.7	12514.3	12407.5	12589.5	12186.5	12482.7	12079.7	12589.5	12514.3
Annual Energy Electricity [kWh/yr]	7646.7	7643.4	7643.1	7639.8	7646.7	7652.9	7643.4	7649.6	7646.7	7643.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,018.69	$ 1,018.23	$ 1,018.18	$ 1,017.72	$ 1,018.69	$ 1,019.57	$ 1,018.23	$ 1,019.1	$ 1,018.69	$ 1,018.18
Annual Energy Natural Gas [m3/yr]	2383.1	2365.9	2363.7	2346.5	2337.6	2128.4	2320.4	2110.9	2307.5	2318.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,027.99	$ 1,020.57	$ 1,019.62	$ 1,012.2	$ 1,008.36	$ 918.12	$ 1,000.94	$ 910.57	$ 995.38	$ 999.99
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	13069	13339	11450	11452	11720	11722	11451	13070
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	19.83	19.68	19.67	19.53	19.45	17.75	19.31	17.6	19.21	19.3
% ICC	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	70.9	70.2	70.1	69.4	70.9	72.3	70.2	71.6	70.9	70.1
Output: MEUI [kWh/(m2 * yr)]	107.4	106.7	106.6	105.8	105.4	96.2	104.6	95.4	104.1	104.6
Output: Better than ERS (%)	2010.0%	2050.0%	2060.0%	2100.0%	2120.0%	2320.0%	2170.0%	2370.0%	2200.0%	2180.0%
Output: Better than Envelope (%)	1530.0%	1610.0%	1610.0%	1700.0%	1530.0%	1360.0%	1610.0%	1440.0%	1530.0%	1610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	701	704	705	708	701	695	704	698	701	705
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 98.86	$ 99.32	$ 99.36	$ 99.83	$ 98.86	$ 97.98	$ 99.32	$ 98.45	$ 98.86	$ 99.36
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 99.21	$ 99.67	$ 99.72	$ 100.18	$ 99.21	$ 98.33	$ 99.67	$ 98.8	$ 99.21	$ 99.72
Annual savings in GHG from electricity savings [kg CO2e/year]	7.7	7.7	7.8	7.8	7.7	7.6	7.7	7.7	7.7	7.8
Annual savings in natural gas [m3/year]	50.25	50.89	50.97	51.61	51.95	59.74	52.59	60.39	53.07	52.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 465.58	$ 471.51	$ 472.27	$ 478.21	$ 481.28	$ 553.5	$ 487.22	$ 559.54	$ 491.67	$ 487.98
Annual savings in carbon tax for natural gas [$/year]	$ 116.21	$ 117.69	$ 117.88	$ 119.36	$ 120.13	$ 138.15	$ 121.61	$ 139.66	$ 122.72	$ 121.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 581.78	$ 589.2	$ 590.15	$ 597.57	$ 601.41	$ 691.65	$ 608.83	$ 699.2	$ 614.39	$ 609.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	2582.3	2615.3	2619.5	2652.4	2669.5	3070	2702.4	3103.5	2727.1	2706.6
Net Present Value [$]	$ 6,299.93	$ 6,231.48	$ 6,156.46	$ 6,088.43	$ 6,130.88	$ 7,817.2	$ 6,062.67	$ 7,751.6	$ 6,082.99	$ 5,987.65
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 023WWR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,052.22	$ 11,326.22	$ 11,361.89	$ 9,231.98	$ 11,527.82	$ 11,546.96	$ 10,272.96	$ 11,641.15	$ 10,367.15	$ 10,367.65
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 15,098.43	$ 17,011.98	$ 17,065.56	$ 13,866.43	$ 17,314.79	$ 17,343.53	$ 15,429.99	$ 17,485.01	$ 15,571.46	$ 15,572.21
Net Present Value [$]	$ 5,307.46	$ 8,810.73	$ 10,881.31	$ 7,807.27	$ 10,078.26	$ 8,872.99	$ 5,310.19	$ 8,908.2	$ 5,412.96	$ 6,188.35
Incremental dollars per GHG saving	$ 1.61	$ 1.61	$ 1.62	$ 1.63	$ 1.64	$ 1.64	$ 1.65	$ 1.66	$ 1.66	$ 1.66
Auxiliary Energy Required Heating [GJ/yr]	67.4	66.3	71.6	71.7	70.9	65.6	66.7	65.6	66.7	71.6
Annual Energy DHW [GJ/yr]	15.8	9.1	9.1	26.5	9.1	9.1	15.8	9.1	15.8	15.8
Annual Energy Space Heating [GJ/yr]	34.7	33.7	36.6	36	35.5	33.5	34.5	33.4	34.4	35.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	78	70.2	73.1	90	71.7	70	77.6	69.9	77.7	78.7
Design Heating Load [W]	13539.6	12684.3	13768.7	13332.7	12684.3	12577.6	13432.9	12609.1	13464.4	12746.3
Annual Energy Electricity [kWh/yr]	17267.4	19512.5	20302.9	17617	19926.5	19450.9	17182.7	19428	17186	17487
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,380.02	$ 2,697.7	$ 2,809.55	$ 2,429.49	$ 2,756.28	$ 2,688.99	$ 2,368.04	$ 2,685.75	$ 2,368.5	$ 2,411.1
Annual Energy Natural Gas [m3/yr]	423.9	0	0	712.8	0	0	423.9	0	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$.	$.	$ 307.48	$.	$.	$ 182.86	$.	$ 182.86	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1741	11464	3634	17722	11410	11734	2011	13084	3361	21127
Upgrade Package List	Pkg1121101031	Pkg2121101031	Pkg1131102031	Pkg2221101011	Pkg2121101021	Pkg2121102031	Pkg1121102031	Pkg2131101031	Pkg1131101031	Pkg2231102011
GHGI [kg/m2]	4.27	0.92	0.95	6.65	0.94	0.91	4.27	0.91	4.27	4.28
% ICC	1.9%	2.2%	2.2%	1.8%	2.2%	2.2%	2.0%	2.2%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	79.8	78.5	84.8	84.9	84	77.8	79.1	77.7	79	84.9
Output: MEUI [kWh/(m2 * yr)]	61.8	52.7	56.1	76.1	54.5	52.4	61.5	52.3	61.5	62.8
Output: Better than ERS (%)	4270.0%	4880.0%	4670.0%	3690.0%	4770.0%	4900.0%	4300.0%	4910.0%	4300.0%	4220.0%
Output: Better than Envelope (%)	450.0%	610.0%	140.0%	160.0%	40.0%	710.0%	550.0%	710.0%	550.0%	140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8920	11165	11955	9269	11579	11103	8835	11080	8838	9139
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,257.66	$ 1,574.22	$ 1,685.67	$ 1,306.96	$ 1,632.6	$ 1,565.54	$ 1,245.72	$ 1,562.31	$ 1,246.19	$ 1,288.63
Annual savings in carbon tax for electricity [$/year]	$ 4.46	$ 5.58	$ 5.98	$ 4.63	$ 5.79	$ 5.55	$ 4.42	$ 5.54	$ 4.42	$ 4.57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,262.12	$ 1,579.81	$ 1,691.65	$ 1,311.59	$ 1,638.39	$ 1,571.09	$ 1,250.14	$ 1,567.85	$ 1,250.61	$ 1,293.2
Annual savings in GHG from electricity savings [kg CO2e/year]	98.1	122.8	131.5	102	127.4	122.1	97.2	121.9	97.2	100.5
Annual savings in natural gas [m3/year]	123.25	139.04	139.04	112.48	139.04	139.04	123.25	139.04	123.25	123.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,141.9	$ 1,288.23	$ 1,288.23	$ 1,042.17	$ 1,288.23	$ 1,288.23	$ 1,141.9	$ 1,288.23	$ 1,141.9	$ 1,141.9
Annual savings in carbon tax for natural gas [$/year]	$ 285.01	$ 321.54	$ 321.54	$ 260.12	$ 321.54	$ 321.54	$ 285.01	$ 321.54	$ 285.01	$ 285.01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,426.91	$ 1,609.77	$ 1,609.77	$ 1,302.29	$ 1,609.77	$ 1,609.77	$ 1,426.91	$ 1,609.77	$ 1,426.91	$ 1,426.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	6333.6	7145.3	7145.3	5780.5	7145.3	7145.3	6333.6	7145.3	6333.6	6333.6
Net Present Value [$]	$ 5,307.46	$ 8,810.73	$ 10,881.31	$ 7,807.27	$ 10,078.26	$ 8,872.99	$ 5,310.19	$ 8,908.2	$ 5,412.96	$ 6,188.35
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$.	$ 2,284.8	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 1,374.	$.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 023WWR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,402.22	$ 7,622.96	$ 7,717.15	$ 7,937.89	$ 7,952.22	$ 8,765.18	$ 8,172.96	$ 8,252.22	$ 8,985.92	$ 8,267.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 11,118.13	$ 11,449.69	$ 11,591.16	$ 11,922.71	$ 11,944.23	$ 13,165.3	$ 12,275.79	$ 12,394.83	$ 13,496.85	$ 12,417.26
Net Present Value [$]	$ 7,817.2	$ 7,751.6	$ 7,670.76	$ 7,604.25	$ 7,589.68	$ 7,545.32	$ 7,523.35	$ 7,503.03	$ 7,478.81	$ 7,443.24
Incremental dollars per GHG saving	$ 2.41	$ 2.45	$ 2.48	$ 2.52	$ 2.52	$ 2.65	$ 2.57	$ 2.58	$ 2.69	$ 2.59
Auxiliary Energy Required Heating [GJ/yr]	61	60.4	60.3	59.7	61	56.6	60.4	61	56	60.4
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	15.8	14.3	13.4	15.8	14.3
Annual Energy Space Heating [GJ/yr]	64.6	64	63.9	63.3	64.6	60	64	64.7	59.3	63.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	106.8	106.1	106.1	105.4	105.4	102.1	104.7	104.4	101.5	104.7
Design Heating Load [W]	12186.5	12079.7	12111.3	12004.5	12186.5	11651.4	12079.7	12186.5	11544.6	12111.3
Annual Energy Electricity [kWh/yr]	7652.9	7649.6	7649.3	7646	7652.9	7629.6	7649.6	7653	7626.3	7649.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,019.57	$ 1,019.1	$ 1,019.06	$ 1,018.59	$ 1,019.57	$ 1,016.27	$ 1,019.1	$ 1,019.58	$ 1,015.81	$ 1,019.06
Annual Energy Natural Gas [m3/yr]	2128.4	2110.9	2109.4	2092	2089.9	2005.3	2072.5	2064.4	1987.9	2070.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 918.12	$ 910.57	$ 909.92	$ 902.42	$ 901.51	$ 865.02	$ 894.	$ 890.51	$ 857.51	$ 893.31
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	13072	13342	11453	17824	11723	11454	18094	13073
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2221101031	Pkg2121102031	Pkg2121101031	Pkg2221102031	Pkg2131101031
GHGI [kg/m2]	17.75	17.6	17.59	17.45	17.43	16.74	17.29	17.22	16.6	17.28
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.7%	1.6%	1.6%	1.7%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	72.3	71.6	71.5	70.8	72.3	67.1	71.6	72.3	66.4	71.5
Output: MEUI [kWh/(m2 * yr)]	96.2	95.4	95.4	94.6	94.5	90.7	93.7	93.4	89.9	93.7
Output: Better than ERS (%)	2320.0%	2370.0%	2370.0%	2420.0%	2420.0%	2650.0%	2470.0%	2490.0%	2700.0%	2470.0%
Output: Better than Envelope (%)	1360.0%	1440.0%	1460.0%	1540.0%	1360.0%	1980.0%	1440.0%	1360.0%	2070.0%	1440.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	695	698	698	702	695	718	698	695	722	698
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 97.98	$ 98.45	$ 98.49	$ 98.95	$ 97.98	$ 101.27	$ 98.45	$ 97.97	$ 101.73	$ 98.49
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .36	$ .35	$ .35	$ .36	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 98.33	$ 98.8	$ 98.84	$ 99.3	$ 98.33	$ 101.63	$ 98.8	$ 98.31	$ 102.09	$ 98.84
Annual savings in GHG from electricity savings [kg CO2e/year]	7.6	7.7	7.7	7.7	7.6	7.9	7.7	7.6	7.9	7.7
Annual savings in natural gas [m3/year]	59.74	60.39	60.45	61.1	61.18	64.33	61.82	62.13	64.98	61.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 553.5	$ 559.54	$ 560.06	$ 566.07	$ 566.79	$ 595.99	$ 572.8	$ 575.59	$ 602.	$ 573.35
Annual savings in carbon tax for natural gas [$/year]	$ 138.15	$ 139.66	$ 139.79	$ 141.29	$ 141.47	$ 148.76	$ 142.97	$ 143.67	$ 150.26	$ 143.11
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 691.65	$ 699.2	$ 699.85	$ 707.35	$ 708.26	$ 744.75	$ 715.76	$ 719.26	$ 752.26	$ 716.45
Annual savings in GHG from natural gas savings [kg CO2e/year]	3070	3103.5	3106.4	3139.7	3143.7	3305.7	3177.1	3192.6	3339	3180.1
Net Present Value [$]	$ 7,817.2	$ 7,751.6	$ 7,670.76	$ 7,604.25	$ 7,589.68	$ 7,545.32	$ 7,523.35	$ 7,503.03	$ 7,478.81	$ 7,443.24
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 023WWR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,315.18	$ 11,535.92	$ 11,630.11	$ 11,752.22	$ 11,850.85	$ 11,865.18	$ 11,915.18	$ 11,972.96	$ 12,067.15	$ 12,085.92
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,995.4	$ 17,326.95	$ 17,468.43	$ 17,651.83	$ 17,799.98	$ 17,821.5	$ 17,896.6	$ 17,983.39	$ 18,124.86	$ 18,153.05
Net Present Value [$]	$ 4,963.25	$ 5,017.65	$ 5,043.45	$ 6,313.63	$ 5,121.23	$ 5,132.29	$ 3,257.62	$ 6,358.73	$ 6,496.5	$ 5,186.7
Incremental dollars per GHG saving	$ 1.99	$ 2.02	$ 2.04	$ 2.06	$ 2.08	$ 2.05	$ 1.91	$ 2.1	$ 2.12	$ 2.09
Auxiliary Energy Required Heating [GJ/yr]	55.3	54.7	54.7	55.9	54.1	55.3	56.4	55.3	55.3	54.7
Annual Energy DHW [GJ/yr]	26.5	26.5	26.5	26.5	26.5	24.8	15.8	26.5	26.5	24.8
Annual Energy Space Heating [GJ/yr]	29.1	28.8	28.7	29.4	28.5	29.1	29.2	29.1	29.1	28.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	1.7	0.8	0.8	0.8	1.7	1.7	0.8
Total Energy [GJ/yr]	83.1	82.8	82.7	84.3	82.5	81.4	72.5	84.1	84.2	81.1
Design Heating Load [W]	12149.3	12042.5	12074.1	11650.5	11967.3	12149.3	11744.9	11543.7	11575.3	12042.5
Annual Energy Electricity [kWh/yr]	15705.1	15640.5	15615.8	16059.2	15560	15705.1	15747.5	15991	16008.6	15640.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,158.96	$ 2,149.82	$ 2,146.32	$ 2,209.06	$ 2,138.42	$ 2,158.96	$ 2,164.96	$ 2,199.41	$ 2,201.9	$ 2,149.82
Annual Energy Natural Gas [m3/yr]	712.2	712.2	711.6	712.4	711.7	666.7	423.9	712.4	712.2	666.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.22	$ 307.22	$ 306.96	$ 307.3	$ 307.	$ 287.59	$ 182.86	$ 307.3	$ 307.22	$ 287.59
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17830	18100	20962	11494	21232	17831	17833	11764	13114	18101
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2121101033	Pkg2231102031	Pkg2221101031	Pkg2221101031	Pkg2121102033	Pkg2131101033	Pkg2221102031
GHGI [kg/m2]	6.55	6.55	6.55	6.57	6.54	6.18	4.2	6.57	6.57	6.18
% ICC	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	65.6	64.9	64.8	66.3	64.1	65.6	66.9	65.5	65.5	64.9
Output: MEUI [kWh/(m2 * yr)]	67.9	67.6	67.5	69.4	67.2	65.9	55.3	69.1	69.2	65.6
Output: Better than ERS (%)	4180.0%	4200.0%	4200.0%	4090.0%	4220.0%	4300.0%	4680.0%	4110.0%	4100.0%	4320.0%
Output: Better than Envelope (%)	2170.0%	2250.0%	2250.0%	2080.0%	2340.0%	2170.0%	2010.0%	2170.0%	2170.0%	2250.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7357	7293	7268	7711	7212	7357	7400	7643	7661	7293
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,037.38	$ 1,028.27	$ 1,024.79	$ 1,087.31	$ 1,016.92	$ 1,037.38	$ 1,043.36	$ 1,077.69	$ 1,080.17	$ 1,028.27
Annual savings in carbon tax for electricity [$/year]	$ 3.68	$ 3.65	$ 3.63	$ 3.86	$ 3.61	$ 3.68	$ 3.7	$ 3.82	$ 3.83	$ 3.65
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,041.06	$ 1,031.92	$ 1,028.42	$ 1,091.16	$ 1,020.53	$ 1,041.06	$ 1,047.06	$ 1,081.51	$ 1,084.	$ 1,031.92
Annual savings in GHG from electricity savings [kg CO2e/year]	80.9	80.2	79.9	84.8	79.3	80.9	81.4	84.1	84.3	80.2
Annual savings in natural gas [m3/year]	112.51	112.51	112.53	112.5	112.53	114.2	123.25	112.5	112.51	114.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,042.38	$ 1,042.38	$ 1,042.58	$ 1,042.31	$ 1,042.55	$ 1,058.08	$ 1,141.9	$ 1,042.31	$ 1,042.38	$ 1,058.08
Annual savings in carbon tax for natural gas [$/year]	$ 260.17	$ 260.17	$ 260.22	$ 260.16	$ 260.22	$ 264.09	$ 285.01	$ 260.16	$ 260.17	$ 264.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,302.55	$ 1,302.55	$ 1,302.81	$ 1,302.46	$ 1,302.77	$ 1,322.18	$ 1,426.91	$ 1,302.46	$ 1,302.55	$ 1,322.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	5781.6	5781.6	5782.8	5781.2	5782.6	5868.7	6333.6	5781.2	5781.6	5868.7
Net Present Value [$]	$ 4,963.25	$ 5,017.65	$ 5,043.45	$ 6,313.63	$ 5,121.23	$ 5,132.29	$ 3,257.62	$ 6,358.73	$ 6,496.5	$ 5,186.7
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	NA	NA	NA	HRV sre 75	HRV sre 75	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$.	$.	$.	$ 1,800.	$ 1,800.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.

MEDIUM 023WWR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,915.18	$ 12,135.92	$ 12,230.11	$ 12,465.18	$ 11,315.18	$ 12,450.85	$ 12,765.18	$ 12,685.92	$ 12,572.96	$ 12,780.11
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,896.6	$ 18,228.15	$ 18,369.63	$ 18,722.7	$ 16,995.4	$ 18,701.18	$ 19,173.3	$ 19,054.25	$ 18,884.59	$ 19,195.73
Net Present Value [$]	$ 3,257.62	$ 3,307.46	$ 3,365.32	$ 3,486.37	$ 4,963.25	$ 3,414.98	$ 3,573.09	$ 3,536.03	$ 4,696.5	$ 3,593.7
Incremental dollars per GHG saving	$ 1.91	$ 1.94	$ 1.96	$ 1.97	$ 1.99	$ 1.99	$ 2.	$ 2.01	$ 2.01	$ 2.02
Auxiliary Energy Required Heating [GJ/yr]	56.4	55.8	55.8	56.4	55.3	55.2	56.5	55.8	56.4	55.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	26.5	15.8	13.4	14.3	15.8	14.3
Annual Energy Space Heating [GJ/yr]	29.2	29	28.9	29.2	29.1	28.7	29.2	29	29.4	29
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7	0.8
Total Energy [GJ/yr]	72.5	72.2	72.2	71	83.1	71.9	70.1	70.8	73.6	70.7
Design Heating Load [W]	11744.9	11638.1	11669.6	11744.9	12149.3	11562.9	11744.9	11638.1	11139.3	11669.6
Annual Energy Electricity [kWh/yr]	15747.5	15681.1	15667	15748.9	15705.1	15600.6	15749.8	15682.5	16050.9	15668.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,164.96	$ 2,155.56	$ 2,153.57	$ 2,165.15	$ 2,158.96	$ 2,144.17	$ 2,165.28	$ 2,155.76	$ 2,207.89	$ 2,153.75
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	385.1	712.2	423.9	359.4	385.1	423.9	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 307.22	$ 182.86	$ 155.03	$ 166.12	$ 182.86	$ 166.12
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	18103	20965	17834	17830	21235	17835	18104	11767	20966
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2121102033	Pkg2231101031
GHGI [kg/m2]	4.2	4.2	4.2	3.88	6.55	4.19	3.67	3.88	4.22	3.88
% ICC	2.3%	2.3%	2.3%	2.4%	2.2%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	66.9	66.1	66.1	66.9	65.6	65.4	66.9	66.2	66.8	66.1
Output: MEUI [kWh/(m2 * yr)]	55.3	55	55	53.6	67.9	54.7	52.5	53.3	56.6	53.3
Output: Better than ERS (%)	4680.0%	4700.0%	4700.0%	4790.0%	4180.0%	4720.0%	4850.0%	4800.0%	4600.0%	4810.0%
Output: Better than Envelope (%)	2010.0%	2100.0%	2100.0%	2010.0%	2170.0%	2180.0%	2000.0%	2100.0%	2010.0%	2100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7400	7333	7319	7401	7357	7253	7402	7335	7703	7320
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,043.36	$ 1,034.	$ 1,032.01	$ 1,043.56	$ 1,037.38	$ 1,022.64	$ 1,043.68	$ 1,034.19	$ 1,086.14	$ 1,032.19
Annual savings in carbon tax for electricity [$/year]	$ 3.7	$ 3.67	$ 3.66	$ 3.7	$ 3.68	$ 3.63	$ 3.7	$ 3.67	$ 3.85	$ 3.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,047.06	$ 1,037.66	$ 1,035.67	$ 1,047.26	$ 1,041.06	$ 1,026.27	$ 1,047.38	$ 1,037.86	$ 1,089.99	$ 1,035.85
Annual savings in GHG from electricity savings [kg CO2e/year]	81.4	80.7	80.5	81.4	80.9	79.8	81.4	80.7	84.7	80.5
Annual savings in natural gas [m3/year]	123.25	123.25	123.25	124.69	112.51	123.25	125.65	124.69	123.25	124.69
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,155.29	$ 1,042.38	$ 1,141.9	$ 1,164.17	$ 1,155.29	$ 1,141.9	$ 1,155.29
Annual savings in carbon tax for natural gas [$/year]	$ 285.01	$ 285.01	$ 285.01	$ 288.36	$ 260.17	$ 285.01	$ 290.57	$ 288.36	$ 285.01	$ 288.36
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,443.65	$ 1,302.55	$ 1,426.91	$ 1,454.74	$ 1,443.65	$ 1,426.91	$ 1,443.65
Annual savings in GHG from natural gas savings [kg CO2e/year]	6333.6	6333.6	6333.6	6407.9	5781.6	6333.6	6457.1	6407.9	6333.6	6407.9
Net Present Value [$]	$ 3,257.62	$ 3,307.46	$ 3,365.32	$ 3,486.37	$ 4,963.25	$ 3,414.98	$ 3,573.09	$ 3,536.03	$ 4,696.5	$ 3,593.7
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$ 550.

MEDIUM 023WWR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 17,413.83	$ 17,519.47	$ 17,710.11	$ 17,815.75	$ 17,856.22	$ 18,156.22	$ 18,152.5	$ 18,452.5	$ 17,551.08	$ 17,687.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 26,155.57	$ 26,314.24	$ 26,600.59	$ 26,759.26	$ 26,820.04	$ 27,270.64	$ 27,265.06	$ 27,715.66	$ 26,361.72	$ 26,567.12
Net Present Value [$]	$ 2,620.32	$ 2,427.73	$ 2,324.04	$ 2,131.45	$ 2,072.39	$ 1,986.16	$ 1,776.11	$ 1,689.88	$ 1,393.02	$ 1,615.13
Incremental dollars per GHG saving	$ 4.08	$ 4.12	$ 4.15	$ 4.19	$ 4.21	$ 4.23	$ 4.28	$ 4.3	$ 3.77	$ 3.81
Auxiliary Energy Required Heating [GJ/yr]	41	41.4	41	41.4	40.6	40.6	40.6	40.6	46.1	46.5
Annual Energy DHW [GJ/yr]	13.4	13.4	13.4	13.4	14.3	13.4	14.3	13.4	7.9	7.9
Annual Energy Space Heating [GJ/yr]	43.5	43.8	43.5	43.8	43	43	43	43	48.9	49.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	84.2	84.6	84.2	84.6	84.7	83.7	84.7	83.7	84.1	84.4
Design Heating Load [W]	8841.2	8851.7	8841.2	8851.7	8788.9	8788.9	8788.9	8788.9	9247.2	9229.3
Annual Energy Electricity [kWh/yr]	7808.4	7810.3	7808.4	7810.3	7806.1	7806.1	7806.1	7806.1	10021.7	10022.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,041.57	$ 1,041.84	$ 1,041.57	$ 1,041.84	$ 1,041.25	$ 1,041.25	$ 1,041.25	$ 1,041.25	$ 1,354.76	$ 1,354.88
Annual Energy Natural Gas [m3/yr]	1505.8	1515.6	1505.8	1515.6	1519.1	1493.6	1519.1	1493.6	1288.3	1298.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 649.55	$ 653.78	$ 649.55	$ 653.78	$ 655.29	$ 644.29	$ 655.29	$ 644.29	$ 555.73	$ 560.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51720	52152	52008	52440	52295	52296	52583	52584	51579	51705
Upgrade Package List	Pkg4331303034	Pkg4341302034	Pkg4331403034	Pkg4341402034	Pkg4341303034	Pkg4341303034	Pkg4341403034	Pkg4341403034	Pkg4331302034	Pkg4331303033
GHGI [kg/m2]	12.67	12.75	12.67	12.75	12.78	12.57	12.78	12.57	10.99	11.07
% ICC	3.3%	3.4%	3.4%	3.4%	3.4%	3.5%	3.5%	3.5%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	48.6	49.1	48.6	49.1	48.1	48.1	48.1	48.1	54.7	55.1
Output: MEUI [kWh/(m2 * yr)]	69.4	69.8	69.4	69.8	70	68.9	70	68.9	69.2	69.7
Output: Better than ERS (%)	3940.0%	3910.0%	3940.0%	3910.0%	3910.0%	3980.0%	3910.0%	3980.0%	4000.0%	3980.0%
Output: Better than Envelope (%)	4190.0%	4140.0%	4190.0%	4140.0%	4250.0%	4250.0%	4250.0%	4250.0%	3470.0%	3410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	539	538	539	538	542	542	542	542	1674	1675
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 76.06	$ 75.79	$ 76.06	$ 75.79	$ 76.38	$ 76.38	$ 76.38	$ 76.38	$ 236.02	$ 236.15
Annual savings in carbon tax for electricity [$/year]	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .27	$ .84	$ .84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 76.33	$ 76.06	$ 76.33	$ 76.06	$ 76.65	$ 76.65	$ 76.65	$ 76.65	$ 236.86	$ 236.98
Annual savings in GHG from electricity savings [kg CO2e/year]	5.9	5.9	5.9	5.9	6	6	6	6	18.4	18.4
Annual savings in natural gas [m3/year]	82.94	82.57	82.94	82.57	82.44	83.39	82.44	83.39	91.04	90.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 768.42	$ 765.04	$ 768.42	$ 765.04	$ 763.83	$ 772.64	$ 763.83	$ 772.64	$ 843.51	$ 840.09
Annual savings in carbon tax for natural gas [$/year]	$ 191.79	$ 190.95	$ 191.79	$ 190.95	$ 190.65	$ 192.85	$ 190.65	$ 192.85	$ 210.54	$ 209.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 960.22	$ 955.99	$ 960.22	$ 955.99	$ 954.48	$ 965.48	$ 954.48	$ 965.48	$ 1,054.04	$ 1,049.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	4262.1	4243.3	4262.1	4243.3	4236.6	4285.5	4236.6	4285.5	4678.6	4659.6
Net Present Value [$]	$ 2,620.32	$ 2,427.73	$ 2,324.04	$ 2,131.45	$ 2,072.39	$ 1,986.16	$ 1,776.11	$ 1,689.88	$ 1,393.02	$ 1,615.13
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	14.09	10.51	14.09	14.09	14.09	14.09	10.51	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 1,286.55	$ 544.16	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.

MEDIUM 023WWR Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 24,115.89	$ 24,336.63	$ 24,430.82	$ 24,576.77	$ 24,584.53	$ 24,615.89	$ 24,651.56	$ 24,665.89	$ 24,797.51	$ 24,805.27
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,222.07	$ 36,553.62	$ 36,695.09	$ 36,914.31	$ 36,925.96	$ 36,973.07	$ 37,026.64	$ 37,048.17	$ 37,245.86	$ 37,257.52
Net Present Value [$]	$ 12,903.27	$ 12,981.11	$ 13,028.02	$ 13,364.15	$ 13,050.62	$ 13,123.67	$ 13,096.12	$ 13,072.32	$ 13,441.99	$ 13,096.81
Incremental dollars per GHG saving	$ 4.22	$ 4.26	$ 4.27	$ 4.3	$ 4.3	$ 4.3	$ 4.31	$ 4.25	$ 4.34	$ 4.34
Auxiliary Energy Required Heating [GJ/yr]	38.9	38.3	38.2	38.9	37.9	37.8	37.7	38.9	38.3	37.4
Annual Energy DHW [GJ/yr]	26.6	26.6	26.5	26.6	26.6	26.6	26.5	24.9	26.6	26.6
Annual Energy Space Heating [GJ/yr]	21.1	20.9	20.8	21.1	20.6	20.7	20.6	21.1	20.9	20.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	76.3	76.1	76	76.3	75.8	75.9	75.8	74.6	76.1	75.6
Design Heating Load [W]	9283.3	9176.5	9208.1	9283.3	9125.2	9238.3	9101.3	9283.3	9176.5	9018.4
Annual Energy Electricity [kWh/yr]	13813.5	13757.6	13741.2	13813.5	13688.3	13703.8	13681.6	13813.5	13757.6	13620.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,891.3	$ 1,883.39	$ 1,881.06	$ 1,891.3	$ 1,873.58	$ 1,875.77	$ 1,872.63	$ 1,891.3	$ 1,883.39	$ 1,863.99
Annual Energy Natural Gas [m3/yr]	713.3	713.4	712.8	713.3	713.4	713.6	712.9	667.8	713.4	713.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 307.69	$ 307.74	$ 307.48	$ 307.69	$ 307.74	$ 307.82	$ 307.52	$ 288.07	$ 307.74	$ 307.74
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	35776	35992	37720	36424	43534	35794	37936	35777	36640	43750
Upgrade Package List	Pkg3221201053	Pkg3221202053	Pkg3231201053	Pkg3221301053	Pkg3321201052	Pkg3221201054	Pkg3231202053	Pkg3221201053	Pkg3221302053	Pkg3321202052
GHGI [kg/m2]	6.47	6.47	6.47	6.47	6.47	6.47	6.47	6.1	6.47	6.47
% ICC	4.6%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	46.1	45.3	45.3	46.1	45	44.8	44.6	46.1	45.3	44.3
Output: MEUI [kWh/(m2 * yr)]	59.8	59.6	59.5	59.8	59.3	59.4	59.3	57.8	59.6	59
Output: Better than ERS (%)	4650.0%	4670.0%	4670.0%	4650.0%	4690.0%	4680.0%	4690.0%	4770.0%	4670.0%	4700.0%
Output: Better than Envelope (%)	4490.0%	4580.0%	4590.0%	4490.0%	4630.0%	4650.0%	4660.0%	4490.0%	4580.0%	4700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5466	5410	5393	5466	5340	5356	5334	5466	5410	5273
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 770.66	$ 762.78	$ 760.47	$ 770.66	$ 753.01	$ 755.2	$ 752.07	$ 770.66	$ 762.78	$ 743.45
Annual savings in carbon tax for electricity [$/year]	$ 2.73	$ 2.7	$ 2.7	$ 2.73	$ 2.67	$ 2.68	$ 2.67	$ 2.73	$ 2.7	$ 2.64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 773.4	$ 765.49	$ 763.17	$ 773.4	$ 755.68	$ 757.87	$ 754.73	$ 773.4	$ 765.49	$ 746.09
Annual savings in GHG from electricity savings [kg CO2e/year]	60.1	59.5	59.3	60.1	58.7	58.9	58.7	60.1	59.5	58
Annual savings in natural gas [m3/year]	112.47	112.46	112.48	112.47	112.46	112.45	112.48	114.16	112.46	112.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,042.	$ 1,041.96	$ 1,042.17	$ 1,042.	$ 1,041.96	$ 1,041.89	$ 1,042.14	$ 1,057.7	$ 1,041.96	$ 1,041.96
Annual savings in carbon tax for natural gas [$/year]	$ 260.08	$ 260.07	$ 260.12	$ 260.08	$ 260.07	$ 260.05	$ 260.11	$ 264.	$ 260.07	$ 260.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,302.08	$ 1,302.03	$ 1,302.29	$ 1,302.08	$ 1,302.03	$ 1,301.95	$ 1,302.25	$ 1,321.7	$ 1,302.03	$ 1,302.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	5779.5	5779.3	5780.5	5779.5	5779.3	5778.9	5780.3	5866.6	5779.3	5779.3
Net Present Value [$]	$ 12,903.27	$ 12,981.11	$ 13,028.02	$ 13,364.15	$ 13,050.62	$ 13,123.67	$ 13,096.12	$ 13,072.32	$ 13,441.99	$ 13,096.81
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	7.04	5.28	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 023WWR Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 28,070.95	$ 28,080.15	$ 28,284.2	$ 28,306.02	$ 25,184.53	$ 25,215.89	$ 28,376.43	$ 28,395.08	$ 25,251.56	$ 28,531.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 42,162.57	$ 42,176.39	$ 42,482.87	$ 42,515.64	$ 37,827.16	$ 37,874.27	$ 42,621.4	$ 42,649.41	$ 37,927.84	$ 42,854.81
Net Present Value [$]	$ 17,120.58	$ 16,872.88	$ 16,529.	$ 16,965.28	$ 11,328.41	$ 11,381.32	$ 17,169.16	$ 16,986.79	$ 11,337.74	$ 17,581.46
Incremental dollars per GHG saving	$ 3.98	$ 3.98	$ 4.01	$ 4.01	$ 4.01	$ 4.02	$ 4.02	$ 4.02	$ 4.02	$ 4.04
Auxiliary Energy Required Heating [GJ/yr]	38.7	38.6	39	39	38.9	38.7	38.6	38	38.6	38.7
Annual Energy DHW [GJ/yr]	9.1	9.1	7.9	8.4	15.8	15.8	9.1	9.1	15.8	9.1
Annual Energy Space Heating [GJ/yr]	20.9	20.5	21	21.1	20.8	20.8	20.5	20.3	20.7	20.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	58.5	58.1	57.3	57.9	65.2	65.2	58.1	57.8	65.1	58.5
Design Heating Load [W]	8625.6	8267.6	8688.5	8700.9	8736.4	8849.5	8267.6	8192.4	8712.5	8625.6
Annual Energy Electricity [kWh/yr]	16236.1	16136.3	15923.5	16084.5	13728.2	13736.6	16136.3	16058.2	13705.8	16236.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,234.09	$ 2,219.97	$ 2,189.86	$ 2,212.64	$ 1,879.23	$ 1,880.41	$ 2,219.97	$ 2,208.92	$ 1,876.06	$ 2,234.09
Annual Energy Natural Gas [m3/yr]	0	0	0	0	423.9	423.9	0	0	423.9	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$ 182.86	$ 182.86	$.	$.	$ 182.86	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45952	51064	45738	44009	43537	35797	51352	51640	37939	46600
Upgrade Package List	Pkg3331203054	Pkg4321302053	Pkg3331202054	Pkg3321203054	Pkg3321201052	Pkg3221201054	Pkg4321402053	Pkg4331302053	Pkg3231202053	Pkg3331303054
GHGI [kg/m2]	0.76	0.76	0.75	0.75	4.11	4.11	0.76	0.75	4.11	0.76
% ICC	5.4%	5.4%	5.4%	5.4%	4.8%	4.8%	5.4%	5.4%	4.8%	5.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	45.9	45.7	46.2	46.2	46.1	45.9	45.7	45	45.8	45.9
Output: MEUI [kWh/(m2 * yr)]	38.7	38.3	37.4	38.1	46.7	46.7	38.3	37.9	46.6	38.7
Output: Better than ERS (%)	5740.0%	5770.0%	5820.0%	5780.0%	5210.0%	5210.0%	5770.0%	5790.0%	5220.0%	5740.0%
Output: Better than Envelope (%)	4520.0%	4530.0%	4480.0%	4480.0%	4490.0%	4520.0%	4530.0%	4620.0%	4530.0%	4520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7888	7788	7576	7737	5380	5389	7788	7710	5358	7888
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,112.25	$ 1,098.18	$ 1,068.17	$ 1,090.87	$ 758.64	$ 759.82	$ 1,098.18	$ 1,087.17	$ 755.48	$ 1,112.25
Annual savings in carbon tax for electricity [$/year]	$ 3.94	$ 3.89	$ 3.79	$ 3.87	$ 2.69	$ 2.69	$ 3.89	$ 3.86	$ 2.68	$ 3.94
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,116.19	$ 1,102.07	$ 1,071.96	$ 1,094.74	$ 761.33	$ 762.52	$ 1,102.07	$ 1,091.02	$ 758.16	$ 1,116.19
Annual savings in GHG from electricity savings [kg CO2e/year]	86.8	85.7	83.3	85.1	59.2	59.3	85.7	84.8	58.9	86.8
Annual savings in natural gas [m3/year]	139.04	139.04	139.04	139.04	123.25	123.25	139.04	139.04	123.25	139.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,288.23	$ 1,288.23	$ 1,288.23	$ 1,288.23	$ 1,141.9	$ 1,141.9	$ 1,288.23	$ 1,288.23	$ 1,141.9	$ 1,288.23
Annual savings in carbon tax for natural gas [$/year]	$ 321.54	$ 321.54	$ 321.54	$ 321.54	$ 285.01	$ 285.01	$ 321.54	$ 321.54	$ 285.01	$ 321.54
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,609.77	$ 1,609.77	$ 1,609.77	$ 1,609.77	$ 1,426.91	$ 1,426.91	$ 1,609.77	$ 1,609.77	$ 1,426.91	$ 1,609.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	7145.3	7145.3	7145.3	7145.3	6333.6	6333.6	7145.3	7145.3	6333.6	7145.3
Net Present Value [$]	$ 17,120.58	$ 16,872.88	$ 16,529.	$ 16,965.28	$ 11,328.41	$ 11,381.32	$ 17,169.16	$ 16,986.79	$ 11,337.74	$ 17,581.46
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	10.51	14.09	8.78	8.78	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR20	BC EffR14	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 2,213.87	$ 1,917.59	$ 1,456.71	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$ 550.	$.	$.	$.	$.	$.	$.

MEDIUM 023WWR Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,624.53	$ 25,845.27	$ 25,939.46	$ 26,160.2	$ 26,124.53	$ 25,405.27	$ 25,184.53	$ 26,174.53	$ 25,251.56	$ 25,215.89
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,488.04	$ 38,819.6	$ 38,961.07	$ 39,292.62	$ 39,239.04	$ 38,158.72	$ 37,827.16	$ 39,314.14	$ 37,927.84	$ 37,874.27
Net Present Value [$]	$ 11,107.27	$ 11,162.95	$ 11,229.76	$ 11,293.84	$ 11,325.36	$ 11,327.86	$ 11,328.41	$ 11,335.65	$ 11,337.74	$ 11,381.32
Incremental dollars per GHG saving	$ 4.08	$ 4.12	$ 4.13	$ 4.17	$ 4.16	$ 4.05	$ 4.01	$ 4.12	$ 4.02	$ 4.02
Auxiliary Energy Required Heating [GJ/yr]	37	36.4	36.4	35.8	35.9	38.3	38.9	37	38.6	38.7
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	15.8	14.3	15.8	15.8
Annual Energy Space Heating [GJ/yr]	19.8	19.6	19.6	19.3	19.4	20.5	20.8	19.9	20.7	20.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	64.3	64.1	64	63.8	63.9	64.9	65.2	62.8	65.1	65.2
Design Heating Load [W]	8526.6	8419.8	8451.4	8344.6	8481.7	8629.6	8736.4	8526.6	8712.5	8849.5
Annual Energy Electricity [kWh/yr]	13471.4	13407.3	13396.7	13335.8	13361.9	13642.3	13728.2	13472.7	13705.8	13736.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,842.89	$ 1,833.82	$ 1,832.32	$ 1,823.7	$ 1,827.39	$ 1,867.07	$ 1,879.23	$ 1,843.07	$ 1,876.06	$ 1,880.41
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	423.9	385.1	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43555	43771	45499	45715	43573	43753	43537	43556	37939	35797
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3331201053	Pkg3331202053	Pkg3321201054	Pkg3321202052	Pkg3321201052	Pkg3321201053	Pkg3221202053	Pkg3221201054
GHGI [kg/m2]	4.09	4.09	4.09	4.09	4.09	4.1	4.11	3.78	4.11	4.11
% ICC	4.9%	4.9%	5.0%	5.0%	5.0%	4.9%	4.8%	5.0%	4.8%	4.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	43.8	43.1	43.1	42.4	42.5	45.4	46.1	43.9	45.8	45.9
Output: MEUI [kWh/(m2 * yr)]	45.6	45.3	45.3	45	45.1	46.3	46.7	43.9	46.6	46.7
Output: Better than ERS (%)	5280.0%	5290.0%	5300.0%	5320.0%	5310.0%	5230.0%	5210.0%	5390.0%	5220.0%	5210.0%
Output: Better than Envelope (%)	4760.0%	4840.0%	4840.0%	4930.0%	4920.0%	4580.0%	4490.0%	4760.0%	4530.0%	4520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5124	5060	5049	4988	5014	5294	5380	5125	5358	5389
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 722.43	$ 713.39	$ 711.89	$ 703.31	$ 706.99	$ 746.52	$ 758.64	$ 722.61	$ 755.48	$ 759.82
Annual savings in carbon tax for electricity [$/year]	$ 2.56	$ 2.53	$ 2.52	$ 2.49	$ 2.51	$ 2.65	$ 2.69	$ 2.56	$ 2.68	$ 2.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 724.99	$ 715.92	$ 714.42	$ 705.8	$ 709.5	$ 749.17	$ 761.33	$ 725.17	$ 758.16	$ 762.52
Annual savings in GHG from electricity savings [kg CO2e/year]	56.4	55.7	55.5	54.9	55.2	58.2	59.2	56.4	58.9	59.3
Annual savings in natural gas [m3/year]	123.25	123.25	123.25	123.25	123.25	123.25	123.25	124.69	123.25	123.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,141.9	$ 1,155.29	$ 1,141.9	$ 1,141.9
Annual savings in carbon tax for natural gas [$/year]	$ 285.01	$ 285.01	$ 285.01	$ 285.01	$ 285.01	$ 285.01	$ 285.01	$ 288.36	$ 285.01	$ 285.01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,426.91	$ 1,443.65	$ 1,426.91	$ 1,426.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	6333.6	6333.6	6333.6	6333.6	6333.6	6333.6	6333.6	6407.9	6333.6	6333.6
Net Present Value [$]	$ 11,107.27	$ 11,162.95	$ 11,229.76	$ 11,293.84	$ 11,325.36	$ 11,327.86	$ 11,328.41	$ 11,335.65	$ 11,337.74	$ 11,381.32
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 023WWR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 6,802.22	$ 7,022.96	$ 7,117.15	$ 7,337.89	$ 7,352.22	$ 7,402.22	$ 7,572.96	$ 7,622.96	$ 7,652.22	$ 7,667.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,216.93	$ 10,548.49	$ 10,689.96	$ 11,021.51	$ 11,043.03	$ 11,118.13	$ 11,374.59	$ 11,449.69	$ 11,493.63	$ 11,516.06
Net Present Value [$]	$ 8,540.87	$ 8,509.3	$ 8,428.82	$ 8,396.84	$ 8,388.81	$ 10,177.85	$ 8,356.27	$ 10,146.83	$ 8,352.81	$ 8,276.76
Incremental dollars per GHG saving	$ 2.22	$ 2.26	$ 2.29	$ 2.33	$ 2.33	$ 2.07	$ 2.37	$ 2.1	$ 2.38	$ 2.39
Auxiliary Energy Required Heating [GJ/yr]	80.1	79.3	79.3	78.5	80.1	80.8	79.3	80.1	80.1	79.3
Annual Energy DHW [GJ/yr]	27	27	26.9	26.9	25.2	16.2	25.2	16.2	24	25.2
Annual Energy Space Heating [GJ/yr]	84.8	84	84	83.1	84.8	85.6	84	84.8	84.8	84
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	138.2	137.4	137.3	136.5	136.4	128.2	135.6	127.4	135.2	135.5
Design Heating Load [W]	13598.8	13484.5	13516.4	13402.1	13598.8	13153.1	13484.5	13038.9	13598.8	13516.4
Annual Energy Electricity [kWh/yr]	7757.4	7753.3	7753.1	7749.1	7757.4	7761.4	7753.3	7757.4	7757.4	7753.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,034.36	$ 1,033.78	$ 1,033.75	$ 1,033.18	$ 1,034.36	$ 1,034.92	$ 1,033.78	$ 1,034.36	$ 1,034.36	$ 1,033.75
Annual Energy Natural Gas [m3/yr]	2960.2	2938.9	2937.3	2916	2912.7	2691.9	2891.5	2670.5	2881.2	2889.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,276.93	$ 1,267.74	$ 1,267.05	$ 1,257.86	$ 1,256.44	$ 1,161.19	$ 1,247.29	$ 1,151.96	$ 1,242.85	$ 1,246.56
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	13069	13339	11450	11452	11720	11722	11451	13070
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	24.54	24.37	24.36	24.18	24.16	22.35	23.98	22.18	23.9	23.97
% ICC	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	94.9	94	93.9	93	94.9	95.8	94	94.9	94.9	93.9
Output: MEUI [kWh/(m2 * yr)]	133.4	132.4	132.3	131.4	131.3	121.5	130.3	120.6	129.9	130.2
Output: Better than ERS (%)	2000.0%	2040.0%	2050.0%	2100.0%	2100.0%	2270.0%	2150.0%	2320.0%	2170.0%	2150.0%
Output: Better than Envelope (%)	0.0%	100.0%	100.0%	200.0%	0.0%	90.0%	100.0%	0.0%	0.0%	100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	756	760	761	765	756	752	760	756	756	761
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 106.64	$ 107.22	$ 107.24	$ 107.81	$ 106.64	$ 106.07	$ 107.22	$ 106.64	$ 106.64	$ 107.24
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 107.02	$ 107.6	$ 107.62	$ 108.19	$ 107.02	$ 106.45	$ 107.6	$ 107.02	$ 107.02	$ 107.62
Annual savings in GHG from electricity savings [kg CO2e/year]	8.3	8.4	8.4	8.4	8.3	8.3	8.4	8.3	8.3	8.4
Annual savings in natural gas [m3/year]	59.59	60.38	60.44	61.24	61.36	69.58	62.15	70.38	62.53	62.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 552.08	$ 559.44	$ 559.99	$ 567.34	$ 568.48	$ 644.7	$ 575.8	$ 652.09	$ 579.36	$ 576.39
Annual savings in carbon tax for natural gas [$/year]	$ 137.8	$ 139.63	$ 139.77	$ 141.61	$ 141.89	$ 160.91	$ 143.72	$ 162.76	$ 144.6	$ 143.86
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 689.88	$ 699.07	$ 699.76	$ 708.95	$ 710.37	$ 805.62	$ 719.52	$ 814.85	$ 723.96	$ 720.25
Annual savings in GHG from natural gas savings [kg CO2e/year]	3062.2	3103	3106	3146.8	3153.1	3575.9	3193.7	3616.9	3213.4	3197
Net Present Value [$]	$ 8,540.87	$ 8,509.3	$ 8,428.82	$ 8,396.84	$ 8,388.81	$ 10,177.85	$ 8,356.27	$ 10,146.83	$ 8,352.81	$ 8,276.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 023WWR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 10,552.22	$ 9,952.22	$ 10,772.96	$ 10,867.15	$ 10,153.82	$ 10,172.96	$ 10,974.56	$ 11,102.22	$ 10,267.15	$ 11,068.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 15,849.43	$ 14,948.23	$ 16,180.99	$ 16,322.46	$ 15,251.04	$ 15,279.79	$ 16,483.79	$ 16,675.53	$ 15,421.26	$ 16,625.26
Net Present Value [$]	$ 7,050.51	$ 8,979.38	$ 6,957.21	$ 7,028.21	$ 10,166.69	$ 8,886.08	$ 8,200.64	$ 7,266.4	$ 8,957.52	$ 8,276.57
Incremental dollars per GHG saving	$ 1.36	$ 1.38	$ 1.39	$ 1.4	$ 1.41	$ 1.41	$ 1.41	$ 1.42	$ 1.42	$ 1.43
Auxiliary Energy Required Heating [GJ/yr]	80.6	79.9	79.8	79.8	84.2	79.1	84.2	80.6	79.1	84.2
Annual Energy DHW [GJ/yr]	16.2	27	16.2	16.2	27	27	16.2	14.7	27	16.2
Annual Energy Space Heating [GJ/yr]	45.9	45.9	45.4	45.4	47.6	45.5	47.2	45.9	45.4	47.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	90.2	101.2	89.8	89.8	102.6	100.7	91.3	88.7	100.7	91.2
Design Heating Load [W]	13253.5	13700.6	13139.2	13171.2	13700.6	13586.3	13139.2	13253.5	13618.2	13171.2
Annual Energy Electricity [kWh/yr]	20575.9	20613.4	20453.9	20444.9	20995	20491.4	20858.6	20577.6	20484.2	20851.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,848.17	$ 2,853.48	$ 2,830.91	$ 2,829.64	$ 2,907.48	$ 2,836.22	$ 2,888.18	$ 2,848.42	$ 2,835.2	$ 2,887.17
Annual Energy Natural Gas [m3/yr]	434.1	724.5	434.1	434.1	724.9	724.5	434.1	393.7	724	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 312.52	$ 187.26	$ 187.26	$ 312.7	$ 312.52	$ 187.26	$ 169.83	$ 312.31	$ 187.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11458	11731	13081	11404	11728	11677	11462	13078	13027
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101021	Pkg2121102031	Pkg2121102021	Pkg2121101031	Pkg2131101031	Pkg2131101021
GHGI [kg/m2]	4.51	6.89	4.51	4.51	6.91	6.88	4.52	4.18	6.88	4.52
% ICC	2.0%	1.9%	2.1%	2.1%	1.9%	1.9%	2.1%	2.1%	2.0%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	95.5	94.7	94.6	94.6	99.8	93.8	99.8	95.5	93.7	99.8
Output: MEUI [kWh/(m2 * yr)]	76.2	89.2	75.7	75.7	91	88.7	77.6	74.4	88.6	77.5
Output: Better than ERS (%)	4430.0%	4010.0%	4450.0%	4450.0%	3930.0%	4040.0%	4360.0%	4520.0%	4040.0%	4360.0%
Output: Better than Envelope (%)	60.0%	20.0%	40.0%	40.0%	510.0%	120.0%	510.0%	60.0%	120.0%	510.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12062	12100	11940	11931	12481	11978	12345	12064	11970	12338
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,700.77	$ 1,706.06	$ 1,683.57	$ 1,682.3	$ 1,759.86	$ 1,688.86	$ 1,740.63	$ 1,701.01	$ 1,687.84	$ 1,739.63
Annual savings in carbon tax for electricity [$/year]	$ 6.03	$ 6.05	$ 5.97	$ 5.97	$ 6.24	$ 5.99	$ 6.17	$ 6.03	$ 5.99	$ 6.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,706.8	$ 1,712.11	$ 1,689.54	$ 1,688.26	$ 1,766.1	$ 1,694.84	$ 1,746.8	$ 1,707.04	$ 1,693.83	$ 1,745.8
Annual savings in GHG from electricity savings [kg CO2e/year]	132.7	133.1	131.3	131.2	137.3	131.8	135.8	132.7	131.7	135.7
Annual savings in natural gas [m3/year]	153.71	142.89	153.71	153.71	142.87	142.89	153.71	155.21	142.91	153.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,424.1	$ 1,323.86	$ 1,424.1	$ 1,424.1	$ 1,323.72	$ 1,323.86	$ 1,424.1	$ 1,438.05	$ 1,324.03	$ 1,424.1
Annual savings in carbon tax for natural gas [$/year]	$ 355.45	$ 330.43	$ 355.45	$ 355.45	$ 330.39	$ 330.43	$ 355.45	$ 358.93	$ 330.47	$ 355.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,779.55	$ 1,654.29	$ 1,779.55	$ 1,779.55	$ 1,654.11	$ 1,654.29	$ 1,779.55	$ 1,796.98	$ 1,654.5	$ 1,779.55
Annual savings in GHG from natural gas savings [kg CO2e/year]	7898.9	7342.9	7898.9	7898.9	7342.1	7342.9	7898.9	7976.2	7343.8	7898.9
Net Present Value [$]	$ 7,050.51	$ 8,979.38	$ 6,957.21	$ 7,028.21	$ 10,166.69	$ 8,886.08	$ 8,200.64	$ 7,266.4	$ 8,957.52	$ 8,276.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,284.8	$ 2,083.2	$ 2,083.2	$ 2,284.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 023WWR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 7,402.22	$ 7,622.96	$ 8,765.18	$ 8,985.92	$ 7,717.15	$ 7,937.89	$ 9,080.11	$ 9,300.85	$ 7,952.22	$ 8,172.96
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 11,118.13	$ 11,449.69	$ 13,165.3	$ 13,496.85	$ 11,591.16	$ 11,922.71	$ 13,638.33	$ 13,969.88	$ 11,944.23	$ 12,275.79
Net Present Value [$]	$ 10,177.85	$ 10,146.83	$ 10,136.45	$ 10,104.53	$ 10,063.14	$ 10,031.39	$ 10,019.13	$ 9,987.15	$ 9,963.73	$ 9,932.65
Incremental dollars per GHG saving	$ 2.07	$ 2.1	$ 2.27	$ 2.3	$ 2.13	$ 2.16	$ 2.32	$ 2.35	$ 2.17	$ 2.21
Auxiliary Energy Required Heating [GJ/yr]	80.8	80.1	75.5	74.7	80	79.3	74.7	73.9	80.8	80.1
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.7	14.7
Annual Energy Space Heating [GJ/yr]	85.6	84.8	80	79.2	84.8	84	79.1	78.3	85.6	84.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	128.2	127.4	122.5	121.7	127.3	126.5	121.7	120.9	126.7	125.9
Design Heating Load [W]	13153.1	13038.9	12580.5	12466.2	13070.8	12956.5	12498.2	12383.9	13153.1	13038.9
Annual Energy Electricity [kWh/yr]	7761.4	7757.4	7733.2	7729.2	7757.2	7753.1	7729	7725	7761.5	7757.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,034.92	$ 1,034.36	$ 1,030.93	$ 1,030.37	$ 1,034.33	$ 1,033.75	$ 1,030.34	$ 1,029.77	$ 1,034.94	$ 1,034.36
Annual Energy Natural Gas [m3/yr]	2691.9	2670.5	2542.8	2521.5	2669.3	2648	2520.5	2499.2	2651.8	2630.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,161.19	$ 1,151.96	$ 1,096.88	$ 1,087.69	$ 1,151.44	$ 1,142.25	$ 1,087.26	$ 1,078.07	$ 1,143.89	$ 1,134.66
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	17824	18094	13072	13342	20956	21226	11453	11723
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2221102031	Pkg2131101031	Pkg2131102031	Pkg2231101031	Pkg2231102031	Pkg2121101031	Pkg2121102031
GHGI [kg/m2]	22.35	22.18	21.13	20.96	22.17	21.99	20.95	20.78	22.03	21.85
% ICC	1.4%	1.5%	1.7%	1.7%	1.5%	1.5%	1.7%	1.8%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	95.8	94.9	89.5	88.6	94.8	93.9	88.5	87.6	95.8	94.9
Output: MEUI [kWh/(m2 * yr)]	121.5	120.6	114.8	113.9	120.5	119.6	113.8	112.9	119.8	118.8
Output: Better than ERS (%)	2270.0%	2320.0%	2610.0%	2660.0%	2320.0%	2370.0%	2660.0%	2710.0%	2360.0%	2410.0%
Output: Better than Envelope (%)	90.0%	0.0%	570.0%	670.0%	10.0%	100.0%	670.0%	770.0%	90.0%	0.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	752	756	780	784	756	761	785	789	752	756
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 106.07	$ 106.64	$ 110.05	$ 110.61	$ 106.67	$ 107.24	$ 110.64	$ 111.21	$ 106.06	$ 106.64
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .39	$ .39	$ .38	$ .38	$ .39	$ .39	$ .38	$ .38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 106.45	$ 107.02	$ 110.44	$ 111.01	$ 107.04	$ 107.62	$ 111.04	$ 111.6	$ 106.44	$ 107.02
Annual savings in GHG from electricity savings [kg CO2e/year]	8.3	8.3	8.6	8.6	8.3	8.4	8.6	8.7	8.3	8.3
Annual savings in natural gas [m3/year]	69.58	70.38	75.14	75.93	70.43	71.22	75.97	76.76	71.08	71.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 644.7	$ 652.09	$ 696.17	$ 703.53	$ 652.5	$ 659.86	$ 703.87	$ 711.22	$ 658.55	$ 665.93
Annual savings in carbon tax for natural gas [$/year]	$ 160.91	$ 162.76	$ 173.76	$ 175.6	$ 162.86	$ 164.7	$ 175.68	$ 177.52	$ 164.37	$ 166.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 805.62	$ 814.85	$ 869.93	$ 879.12	$ 815.37	$ 824.55	$ 879.55	$ 888.74	$ 822.92	$ 832.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	3575.9	3616.9	3861.4	3902.1	3619.2	3659.9	3904.1	3944.8	3652.7	3693.6
Net Present Value [$]	$ 10,177.85	$ 10,146.83	$ 10,136.45	$ 10,104.53	$ 10,063.14	$ 10,031.39	$ 10,019.13	$ 9,987.15	$ 9,963.73	$ 9,932.65
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

MEDIUM 023WWR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85
Total increase in construction cost [$]	$ 15,980.53	$ 16,076.2	$ 16,107.56	$ 16,201.27	$ 16,244.31	$ 16,295.46	$ 16,398.02	$ 16,429.38	$ 16,441.41	$ 16,480.53
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,002.76	$ 24,146.45	$ 24,193.56	$ 24,334.31	$ 24,398.95	$ 24,475.78	$ 24,629.83	$ 24,676.93	$ 24,695.	$ 24,753.76
Net Present Value [$]	$ 9,068.11	$ 9,517.34	$ 9,683.69	$ 9,027.45	$ 9,835.35	$ 9,107.6	$ 9,800.01	$ 9,963.13	$ 9,528.99	$ 9,237.38
Incremental dollars per GHG saving	$ 2.21	$ 2.22	$ 2.23	$ 2.24	$ 2.25	$ 2.25	$ 2.27	$ 2.27	$ 2.27	$ 2.28
Auxiliary Energy Required Heating [GJ/yr]	62.6	63.5	63.5	61.9	63.7	61.9	63.3	63.3	62.6	61.5
Annual Energy DHW [GJ/yr]	27	27	27	27	27	27	27	27	27	27
Annual Energy Space Heating [GJ/yr]	36.5	37	37.2	36.2	37.2	36.1	36.9	37.1	36.5	36
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	92.9	93.4	93.6	92.5	93.6	92.5	93.3	93.5	92.9	92.5
Design Heating Load [W]	10906.8	10934.6	11055.7	10792.5	11036.6	10824.4	10949.8	11070.9	10906.8	10858.7
Annual Energy Electricity [kWh/yr]	18302.7	18441.9	18493.4	18200.8	18499.9	18197.3	18424.8	18475	18302.7	18172.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,526.52	$ 2,546.21	$ 2,553.5	$ 2,512.1	$ 2,554.42	$ 2,511.6	$ 2,543.79	$ 2,550.9	$ 2,526.52	$ 2,508.15
Annual Energy Natural Gas [m3/yr]	725.6	725	725.3	725.7	725.1	725.1	725.6	725.9	725.6	726
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.	$ 312.74	$ 312.87	$ 313.04	$ 312.78	$ 312.78	$ 313.	$ 313.13	$ 313.	$ 313.17
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43444	45586	37846	43660	38044	45388	43858	36118	44092	43462
Upgrade Package List	Pkg3321201033	Pkg3331202032	Pkg3231202034	Pkg3321202033	Pkg3231203033	Pkg3331201033	Pkg3321203032	Pkg3221203034	Pkg3321301033	Pkg3321201034
GHGI [kg/m2]	6.79	6.79	6.78	6.78	6.79	6.78	6.79	6.8	6.79	6.78
% ICC	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	74.2	75.2	75.3	73.4	75.5	73.3	75	75	74.2	72.8
Output: MEUI [kWh/(m2 * yr)]	79.4	79.9	80.2	78.9	80.2	78.9	79.9	80.1	79.4	78.8
Output: Better than ERS (%)	4500.0%	4470.0%	4460.0%	4520.0%	4460.0%	4520.0%	4480.0%	4460.0%	4500.0%	4520.0%
Output: Better than Envelope (%)	2180.0%	2070.0%	2070.0%	2270.0%	2050.0%	2270.0%	2100.0%	2100.0%	2180.0%	2320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9789	9928	9980	9687	9986	9684	9911	9961	9789	9659
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,380.25	$ 1,399.88	$ 1,407.14	$ 1,365.88	$ 1,408.05	$ 1,365.39	$ 1,397.47	$ 1,404.54	$ 1,380.25	$ 1,361.95
Annual savings in carbon tax for electricity [$/year]	$ 4.89	$ 4.96	$ 4.99	$ 4.84	$ 4.99	$ 4.84	$ 4.96	$ 4.98	$ 4.89	$ 4.83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,385.14	$ 1,404.84	$ 1,412.13	$ 1,370.72	$ 1,413.05	$ 1,370.23	$ 1,402.42	$ 1,409.52	$ 1,385.14	$ 1,366.78
Annual savings in GHG from electricity savings [kg CO2e/year]	107.7	109.2	109.8	106.6	109.8	106.5	109	109.6	107.7	106.3
Annual savings in natural gas [m3/year]	142.85	142.87	142.86	142.84	142.87	142.87	142.85	142.84	142.85	142.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,323.48	$ 1,323.68	$ 1,323.58	$ 1,323.44	$ 1,323.65	$ 1,323.65	$ 1,323.48	$ 1,323.37	$ 1,323.48	$ 1,323.34
Annual savings in carbon tax for natural gas [$/year]	$ 330.33	$ 330.39	$ 330.36	$ 330.33	$ 330.38	$ 330.38	$ 330.33	$ 330.31	$ 330.33	$ 330.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,653.81	$ 1,654.07	$ 1,653.94	$ 1,653.77	$ 1,654.03	$ 1,654.03	$ 1,653.81	$ 1,653.68	$ 1,653.81	$ 1,653.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	7340.7	7341.9	7341.3	7340.6	7341.7	7341.7	7340.7	7340.2	7340.7	7340
Net Present Value [$]	$ 9,068.11	$ 9,517.34	$ 9,683.69	$ 9,027.45	$ 9,835.35	$ 9,107.6	$ 9,800.01	$ 9,963.13	$ 9,528.99	$ 9,237.38
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	10.51	14.09	8.78	14.09	14.09	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR80	CeilR50	CeilR80	CeilR80	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 305.64	$ 1,163.13	$ 1,163.13	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	5.28	7.04	5.28	7.04	7.04	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 023WWR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,580.53	$ 16,801.27	$ 16,895.46	$ 17,130.53	$ 16,998.02	$ 17,029.38	$ 17,041.41	$ 17,080.53	$ 17,116.2	$ 17,430.53
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,903.96	$ 25,235.51	$ 25,376.98	$ 25,730.06	$ 25,531.03	$ 25,578.13	$ 25,596.2	$ 25,654.96	$ 25,708.53	$ 26,180.66
Net Present Value [$]	$ 7,256.	$ 7,165.62	$ 7,218.91	$ 7,471.53	$ 7,897.16	$ 8,078.06	$ 7,716.88	$ 7,338.43	$ 7,207.95	$ 7,539.17
Incremental dollars per GHG saving	$ 2.13	$ 2.16	$ 2.17	$ 2.18	$ 2.18	$ 2.19	$ 2.19	$ 2.19	$ 2.2	$ 2.2
Auxiliary Energy Required Heating [GJ/yr]	63.4	62.6	62.6	63.4	64	64	63.4	62.2	61.8	63.4
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	14.7	16.2	16.2	16.2	16.2	16.2	13.7
Annual Energy Space Heating [GJ/yr]	36.6	36.1	36.1	36.6	37	37.1	36.6	36	35.7	36.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	82.1	81.7	81.6	80.6	82.4	82.6	82.1	81.5	81.3	79.6
Design Heating Load [W]	10477.1	10362.8	10394.7	10477.1	10520.1	10641.2	10477.1	10429	10280.5	10477.1
Annual Energy Electricity [kWh/yr]	18314.1	18193.3	18177.4	18315.7	18401	18459.1	18314.1	18151.9	18087.4	18313
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,528.13	$ 2,511.04	$ 2,508.79	$ 2,528.36	$ 2,540.43	$ 2,548.65	$ 2,528.13	$ 2,505.18	$ 2,496.05	$ 2,527.97
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	393.7	434.1	434.1	434.1	434.1	434.1	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 158.22
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43447	43663	45391	43448	43861	36121	44095	43465	45607	43449
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3331201033	Pkg3321201033	Pkg3321203032	Pkg3321203034	Pkg3321301033	Pkg3321201034	Pkg3331202033	Pkg3321201033
GHGI [kg/m2]	4.41	4.4	4.4	4.08	4.41	4.41	4.41	4.4	4.39	3.86
% ICC	3.2%	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.1	74.2	74.2	75.1	75.8	75.9	75.1	73.7	73.3	75.1
Output: MEUI [kWh/(m2 * yr)]	66.6	66	66	64.8	66.9	67.2	66.6	65.9	65.6	63.6
Output: Better than ERS (%)	4930.0%	4950.0%	4960.0%	5020.0%	4910.0%	4890.0%	4930.0%	4960.0%	4980.0%	5080.0%
Output: Better than Envelope (%)	2080.0%	2180.0%	2180.0%	2080.0%	2010.0%	2010.0%	2080.0%	2230.0%	2280.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9800	9680	9664	9802	9887	9945	9800	9638	9574	9799
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,381.86	$ 1,364.82	$ 1,362.58	$ 1,382.08	$ 1,394.11	$ 1,402.3	$ 1,381.86	$ 1,358.99	$ 1,349.89	$ 1,381.7
Annual savings in carbon tax for electricity [$/year]	$ 4.9	$ 4.84	$ 4.83	$ 4.9	$ 4.94	$ 4.97	$ 4.9	$ 4.82	$ 4.79	$ 4.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,386.76	$ 1,369.66	$ 1,367.41	$ 1,386.98	$ 1,399.05	$ 1,407.27	$ 1,386.76	$ 1,363.81	$ 1,354.68	$ 1,386.6
Annual savings in GHG from electricity savings [kg CO2e/year]	107.8	106.5	106.3	107.8	108.8	109.4	107.8	106	105.3	107.8
Annual savings in natural gas [m3/year]	153.71	153.71	153.71	155.21	153.71	153.71	153.71	153.71	153.71	156.22
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,438.05	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,447.34
Annual savings in carbon tax for natural gas [$/year]	$ 355.45	$ 355.45	$ 355.45	$ 358.93	$ 355.45	$ 355.45	$ 355.45	$ 355.45	$ 355.45	$ 361.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,796.98	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,808.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	7898.9	7898.9	7898.9	7976.2	7898.9	7898.9	7898.9	7898.9	7898.9	8027.7
Net Present Value [$]	$ 7,256.	$ 7,165.62	$ 7,218.91	$ 7,471.53	$ 7,897.16	$ 8,078.06	$ 7,716.88	$ 7,338.43	$ 7,207.95	$ 7,539.17
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	14.09	14.09	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR80	CeilR80	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 1,163.13	$ 1,163.13	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 4,297.11	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.	$ 850.

MEDIUM 023WWR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 22,474.53	$ 22,695.27	$ 22,789.46	$ 23,010.2	$ 18,187.83	$ 22,974.53	$ 23,024.53	$ 23,195.27	$ 23,245.27	$ 23,324.53
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,756.74	$ 34,088.3	$ 34,229.77	$ 34,561.32	$ 27,318.12	$ 34,507.74	$ 34,582.84	$ 34,839.3	$ 34,914.4	$ 35,033.44
Net Present Value [$]	$ 1,610.11	$ 1,572.91	$ 1,481.33	$ 1,444.12	$ 1,416.33	$ 1,396.37	$ 1,395.81	$ 1,358.43	$ 1,358.37	$ 1,319.29
Incremental dollars per GHG saving	$ 4.38	$ 4.39	$ 4.41	$ 4.42	$ 3.36	$ 4.42	$ 4.42	$ 4.43	$ 4.43	$ 4.44
Auxiliary Energy Required Heating [GJ/yr]	51.9	51.1	51.1	50.4	61.5	50.7	51.9	50	51.2	51.9
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	8	16.2	14.7	16.2	14.7	13.7
Annual Energy Space Heating [GJ/yr]	55	54.2	54.2	53.4	65.2	53.7	55	52.9	54.2	55
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	98.5	97.7	97.7	96.9	100.5	97.2	97	96.4	96.2	96
Design Heating Load [W]	9110	8995.7	9027.6	8913.4	9894.2	9061.9	9110	8947.6	8995.7	9110
Annual Energy Electricity [kWh/yr]	7865.7	7861.8	7861.7	7857.8	10140.4	7859.6	7865.8	7855.7	7861.9	7865.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,049.68	$ 1,049.13	$ 1,049.12	$ 1,048.56	$ 1,371.55	$ 1,048.82	$ 1,049.7	$ 1,048.27	$ 1,049.14	$ 1,049.7
Annual Energy Natural Gas [m3/yr]	1883.3	1862.6	1862.3	1841.6	1719.1	1851	1843.2	1830.4	1822.5	1816.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 812.39	$ 803.46	$ 803.33	$ 794.4	$ 741.56	$ 798.46	$ 795.09	$ 789.57	$ 786.16	$ 783.57
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43546	43762	45490	45706	51723	43564	43547	43780	43763	43548
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3331201053	Pkg3331202053	Pkg4331303034	Pkg3321201054	Pkg3321201053	Pkg3321202054	Pkg3321202053	Pkg3321201053
GHGI [kg/m2]	15.75	15.58	15.58	15.41	14.52	15.49	15.43	15.32	15.26	15.21
% ICC	4.3%	4.3%	4.4%	4.4%	3.5%	4.4%	4.4%	4.4%	4.4%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	61.5	60.6	60.6	59.7	72.9	60.1	61.5	59.2	60.6	61.5
Output: MEUI [kWh/(m2 * yr)]	86.3	85.4	85.4	84.4	88.8	84.9	84.5	83.9	83.6	83.4
Output: Better than ERS (%)	4060.0%	4110.0%	4110.0%	4160.0%	4000.0%	4140.0%	4150.0%	4190.0%	4200.0%	4210.0%
Output: Better than Envelope (%)	3520.0%	3620.0%	3620.0%	3710.0%	2320.0%	3670.0%	3520.0%	3760.0%	3610.0%	3520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	648	652	652	656	1627	654	648	658	652	648
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 91.37	$ 91.92	$ 91.93	$ 92.48	$ 229.36	$ 92.23	$ 91.35	$ 92.78	$ 91.9	$ 91.35
Annual savings in carbon tax for electricity [$/year]	$ .32	$ .33	$ .33	$ .33	$ .81	$ .33	$ .32	$ .33	$ .33	$ .32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 91.69	$ 92.24	$ 92.26	$ 92.81	$ 230.18	$ 92.56	$ 91.68	$ 93.11	$ 92.23	$ 91.68
Annual savings in GHG from electricity savings [kg CO2e/year]	7.1	7.2	7.2	7.2	17.9	7.2	7.1	7.2	7.2	7.1
Annual savings in natural gas [m3/year]	99.71	100.48	100.49	101.27	105.83	100.92	101.21	101.68	101.98	102.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 923.83	$ 930.98	$ 931.08	$ 938.23	$ 980.52	$ 934.98	$ 937.68	$ 942.1	$ 944.82	$ 946.89
Annual savings in carbon tax for natural gas [$/year]	$ 230.58	$ 232.37	$ 232.39	$ 234.18	$ 244.73	$ 233.37	$ 234.04	$ 235.14	$ 235.82	$ 236.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,154.42	$ 1,163.35	$ 1,163.48	$ 1,172.41	$ 1,225.25	$ 1,168.35	$ 1,171.72	$ 1,177.24	$ 1,180.65	$ 1,183.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	5124.1	5163.7	5164.3	5203.9	5438.5	5186	5200.9	5225.4	5240.5	5252
Net Present Value [$]	$ 1,610.11	$ 1,572.91	$ 1,481.33	$ 1,444.12	$ 1,416.33	$ 1,396.37	$ 1,395.81	$ 1,358.43	$ 1,358.37	$ 1,319.29
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	14.09	8.78	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR80	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 2,083.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 850.	$.	$ 550.	$.	$ 550.	$ 850.

MEDIUM 023WWR Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75
Total increase in construction cost [$]	$ 26,706.15	$ 27,002.43	$ 27,021.08	$ 27,206.15	$ 27,246.95	$ 27,256.15	$ 27,296.95	$ 27,306.15	$ 27,317.36	$ 27,342.9
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 40,112.64	$ 40,557.65	$ 40,585.66	$ 40,863.64	$ 40,924.92	$ 40,938.74	$ 41,000.02	$ 41,013.84	$ 41,030.67	$ 41,069.04
Net Present Value [$]	$ 13,911.14	$ 14,207.42	$ 13,956.1	$ 14,092.03	$ 14,557.44	$ 14,063.2	$ 12,474.79	$ 12,102.2	$ 14,252.38	$ 14,223.67
Incremental dollars per GHG saving	$ 3.68	$ 3.72	$ 3.72	$ 3.75	$ 3.71	$ 3.71	$ 3.49	$ 3.49	$ 3.76	$ 3.77
Auxiliary Energy Required Heating [GJ/yr]	47	47	46.3	45.9	47.6	47	48.1	47.9	46.3	46
Annual Energy DHW [GJ/yr]	27	27	27	27	25.3	25.3	16.2	16.2	27	27
Annual Energy Space Heating [GJ/yr]	28	28	27.6	27.5	28.7	28	28.7	28.1	27.6	27.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	84.7	84.7	84.3	84.3	83.6	82.9	74.4	73.9	84.3	84.2
Design Heating Load [W]	8915.5	8915.5	8833.2	8867.4	9324	8915.5	8894.3	8530.7	8833.2	8848.3
Annual Energy Electricity [kWh/yr]	16016.4	16016.4	15913.1	15891.5	16211.6	16016.4	16178.7	16030.4	15913.1	15890.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,203.01	$ 2,203.01	$ 2,188.39	$ 2,185.33	$ 2,230.63	$ 2,203.01	$ 2,225.97	$ 2,204.99	$ 2,188.39	$ 2,185.13
Annual Energy Natural Gas [m3/yr]	726	726	725.5	726.3	678.6	678.5	434.1	434.1	725.5	726.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.17	$ 313.17	$ 312.96	$ 313.3	$ 292.72	$ 292.68	$ 187.26	$ 187.26	$ 312.96	$ 313.21
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51058	51346	51634	51076	45947	51059	45949	51061	51922	51202
Upgrade Package List	Pkg4321302053	Pkg4321402053	Pkg4331302053	Pkg4321302054	Pkg3331203054	Pkg4321302053	Pkg3331203054	Pkg4321302053	Pkg4331402053	Pkg4321303053
GHGI [kg/m2]	6.68	6.68	6.67	6.68	6.3	6.29	4.31	4.3	6.67	6.68
% ICC	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	55.7	55.7	54.8	54.4	56.4	55.7	57	56.7	54.8	54.6
Output: MEUI [kWh/(m2 * yr)]	69.6	69.6	69.1	69.1	68.3	67.5	57.4	56.8	69.1	69.1
Output: Better than ERS (%)	4990.0%	4990.0%	5010.0%	5010.0%	5050.0%	5090.0%	5400.0%	5430.0%	5010.0%	5010.0%
Output: Better than Envelope (%)	4130.0%	4130.0%	4220.0%	4270.0%	4060.0%	4130.0%	4000.0%	4020.0%	4220.0%	4260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7503	7503	7399	7378	7698	7503	7665	7517	7399	7376
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 1,057.88	$ 1,057.88	$ 1,043.32	$ 1,040.27	$ 1,085.4	$ 1,057.88	$ 1,080.76	$ 1,059.85	$ 1,043.32	$ 1,040.07
Annual savings in carbon tax for electricity [$/year]	$ 3.75	$ 3.75	$ 3.7	$ 3.69	$ 3.85	$ 3.75	$ 3.83	$ 3.76	$ 3.7	$ 3.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,061.63	$ 1,061.63	$ 1,047.02	$ 1,043.96	$ 1,089.25	$ 1,061.63	$ 1,084.6	$ 1,063.61	$ 1,047.02	$ 1,043.76
Annual savings in GHG from electricity savings [kg CO2e/year]	82.5	82.5	81.4	81.2	84.7	82.5	84.3	82.7	81.4	81.1
Annual savings in natural gas [m3/year]	142.83	142.83	142.85	142.82	144.6	144.6	153.71	153.71	142.85	142.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,323.34	$ 1,323.34	$ 1,323.51	$ 1,323.24	$ 1,339.7	$ 1,339.74	$ 1,424.1	$ 1,424.1	$ 1,323.51	$ 1,323.3
Annual savings in carbon tax for natural gas [$/year]	$ 330.3	$ 330.3	$ 330.34	$ 330.27	$ 334.38	$ 334.39	$ 355.45	$ 355.45	$ 330.34	$ 330.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,653.64	$ 1,653.64	$ 1,653.85	$ 1,653.51	$ 1,674.08	$ 1,674.13	$ 1,779.55	$ 1,779.55	$ 1,653.85	$ 1,653.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	7340	7340	7340.9	7339.4	7430.7	7430.9	7898.9	7898.9	7340.9	7339.8
Net Present Value [$]	$ 13,911.14	$ 14,207.42	$ 13,956.1	$ 14,092.03	$ 14,557.44	$ 14,063.2	$ 12,474.79	$ 12,102.2	$ 14,252.38	$ 14,223.67
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	14.09	10.51	14.09	10.51	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 2,213.87	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$.

MEDIUM 023WWR Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,296.95	$ 27,306.15	$ 27,856.15	$ 27,846.95	$ 27,602.43	$ 27,621.08	$ 28,146.95	$ 28,156.15	$ 27,757.83	$ 27,806.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,000.02	$ 41,013.84	$ 41,839.94	$ 41,826.12	$ 41,458.85	$ 41,486.86	$ 42,276.72	$ 42,290.54	$ 41,692.26	$ 41,764.84
Net Present Value [$]	$ 12,474.79	$ 12,102.2	$ 12,317.73	$ 12,690.32	$ 12,398.48	$ 12,146.18	$ 12,767.45	$ 12,394.87	$ 12,935.67	$ 12,257.48
Incremental dollars per GHG saving	$ 3.49	$ 3.49	$ 3.53	$ 3.53	$ 3.53	$ 3.53	$ 3.54	$ 3.54	$ 3.55	$ 3.56
Auxiliary Energy Required Heating [GJ/yr]	48.1	47.9	47.9	48.1	47.9	47.1	48.2	47.9	48.1	46.7
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	14.7	16.2	16.2	13.7	13.7	16.2	16.2
Annual Energy Space Heating [GJ/yr]	28.7	28.1	28.1	28.7	28.1	27.8	28.7	28.1	28.7	27.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	74.4	73.9	72.4	72.9	73.9	73.5	71.9	71.4	74.4	73.4
Design Heating Load [W]	8894.3	8530.7	8530.7	8894.3	8530.7	8448.3	8894.3	8530.7	8894.3	8482.6
Annual Energy Electricity [kWh/yr]	16178.7	16030.4	16031.9	16180.2	16030.4	15925.1	16181.2	16032.9	16178.7	15896.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,225.97	$ 2,204.99	$ 2,205.2	$ 2,226.18	$ 2,204.99	$ 2,190.09	$ 2,226.32	$ 2,205.34	$ 2,225.97	$ 2,186.04
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	393.7	434.1	434.1	366.8	366.8	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 187.26	$ 187.26	$ 158.22	$ 158.22	$ 187.26	$ 187.26
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45949	51061	51062	45950	51349	51637	45951	51063	46597	51079
Upgrade Package List	Pkg3331203054	Pkg4321302053	Pkg4321302053	Pkg3331203054	Pkg4321402053	Pkg4331302053	Pkg3331203054	Pkg4321302053	Pkg3331303054	Pkg4321302054
GHGI [kg/m2]	4.31	4.3	3.97	3.98	4.3	4.29	3.76	3.75	4.31	4.29
% ICC	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%	5.3%	5.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	57	56.7	56.7	57.1	56.7	55.9	57.1	56.8	57	55.4
Output: MEUI [kWh/(m2 * yr)]	57.4	56.8	55	55.6	56.8	56.3	54.4	53.8	57.4	56.2
Output: Better than ERS (%)	5400.0%	5430.0%	5530.0%	5490.0%	5430.0%	5460.0%	5560.0%	5590.0%	5400.0%	5460.0%
Output: Better than Envelope (%)	4000.0%	4020.0%	4020.0%	4000.0%	4020.0%	4120.0%	3980.0%	4020.0%	4000.0%	4170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7665	7517	7518	7666	7517	7411	7668	7519	7665	7383
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,080.76	$ 1,059.85	$ 1,060.07	$ 1,080.98	$ 1,059.85	$ 1,045.01	$ 1,081.12	$ 1,060.21	$ 1,080.76	$ 1,040.97
Annual savings in carbon tax for electricity [$/year]	$ 3.83	$ 3.76	$ 3.76	$ 3.83	$ 3.76	$ 3.71	$ 3.83	$ 3.76	$ 3.83	$ 3.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,084.6	$ 1,063.61	$ 1,063.83	$ 1,084.81	$ 1,063.61	$ 1,048.71	$ 1,084.95	$ 1,063.97	$ 1,084.6	$ 1,044.67
Annual savings in GHG from electricity savings [kg CO2e/year]	84.3	82.7	82.7	84.3	82.7	81.5	84.3	82.7	84.3	81.2
Annual savings in natural gas [m3/year]	153.71	153.71	155.21	155.21	153.71	153.71	156.22	156.22	153.71	153.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,424.1	$ 1,424.1	$ 1,438.05	$ 1,438.05	$ 1,424.1	$ 1,424.1	$ 1,447.34	$ 1,447.34	$ 1,424.1	$ 1,424.1
Annual savings in carbon tax for natural gas [$/year]	$ 355.45	$ 355.45	$ 358.93	$ 358.93	$ 355.45	$ 355.45	$ 361.25	$ 361.25	$ 355.45	$ 355.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,779.55	$ 1,779.55	$ 1,796.98	$ 1,796.98	$ 1,779.55	$ 1,779.55	$ 1,808.58	$ 1,808.58	$ 1,779.55	$ 1,779.55
Annual savings in GHG from natural gas savings [kg CO2e/year]	7898.9	7898.9	7976.2	7976.2	7898.9	7898.9	8027.7	8027.7	7898.9	7898.9
Net Present Value [$]	$ 12,474.79	$ 12,102.2	$ 12,317.73	$ 12,690.32	$ 12,398.48	$ 12,146.18	$ 12,767.45	$ 12,394.87	$ 12,935.67	$ 12,257.48
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	10.51	14.09	10.51	10.51	14.09	10.51	14.09	10.51
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 2,213.87	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$.	$.

MEDIUM 023WWR Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 27,306.15	$ 27,621.08	$ 27,806.15	$ 28,121.08	$ 27,856.15	$ 28,171.08	$ 28,156.15	$ 27,602.43	$ 27,942.9	$ 28,471.08
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,013.84	$ 41,486.86	$ 41,764.84	$ 42,237.86	$ 41,839.94	$ 42,312.96	$ 42,290.54	$ 41,458.85	$ 41,970.24	$ 42,763.56
Net Present Value [$]	$ 12,102.2	$ 12,146.18	$ 12,257.48	$ 12,303.28	$ 12,317.73	$ 12,361.52	$ 12,394.87	$ 12,398.48	$ 12,408.29	$ 12,438.66
Incremental dollars per GHG saving	$ 3.49	$ 3.53	$ 3.56	$ 3.6	$ 3.53	$ 3.57	$ 3.54	$ 3.53	$ 3.57	$ 3.58
Auxiliary Energy Required Heating [GJ/yr]	47.9	47.1	46.7	46	47.9	47.1	47.9	47.9	46.9	47.2
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	14.7	14.7	13.7	16.2	16.2	13.7
Annual Energy Space Heating [GJ/yr]	28.1	27.8	27.7	27.3	28.1	27.8	28.1	28.1	27.7	27.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	73.9	73.5	73.4	73	72.4	72	71.4	73.9	73.4	71
Design Heating Load [W]	8530.7	8448.3	8482.6	8400.2	8530.7	8448.3	8530.7	8530.7	8463.4	8448.3
Annual Energy Electricity [kWh/yr]	16030.4	15925.1	15896.5	15791.9	16031.9	15926.6	16032.9	16030.4	15901.9	15927.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,204.99	$ 2,190.09	$ 2,186.04	$ 2,171.24	$ 2,205.2	$ 2,190.3	$ 2,205.34	$ 2,204.99	$ 2,186.8	$ 2,190.44
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	393.7	393.7	366.8	434.1	434.1	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 158.22	$ 187.26	$ 187.26	$ 158.22
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51061	51637	51079	51655	51062	51638	51063	51349	51205	51639
Upgrade Package List	Pkg4321302053	Pkg4331302053	Pkg4321302054	Pkg4331302054	Pkg4321302053	Pkg4331302053	Pkg4321302053	Pkg4321402053	Pkg4321303053	Pkg4331302053
GHGI [kg/m2]	4.3	4.29	4.29	4.29	3.97	3.96	3.75	4.3	4.29	3.74
% ICC	5.2%	5.3%	5.3%	5.4%	5.3%	5.4%	5.4%	5.3%	5.3%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.7	55.9	55.4	54.5	56.7	55.9	56.8	56.7	55.6	55.9
Output: MEUI [kWh/(m2 * yr)]	56.8	56.3	56.2	55.8	55	54.5	53.8	56.8	56.2	53.4
Output: Better than ERS (%)	5430.0%	5460.0%	5460.0%	5490.0%	5530.0%	5550.0%	5590.0%	5430.0%	5460.0%	5610.0%
Output: Better than Envelope (%)	4020.0%	4120.0%	4170.0%	4260.0%	4020.0%	4120.0%	4020.0%	4020.0%	4140.0%	4110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7517	7411	7383	7278	7518	7413	7519	7517	7388	7414
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,059.85	$ 1,045.01	$ 1,040.97	$ 1,026.23	$ 1,060.07	$ 1,045.22	$ 1,060.21	$ 1,059.85	$ 1,041.74	$ 1,045.36
Annual savings in carbon tax for electricity [$/year]	$ 3.76	$ 3.71	$ 3.69	$ 3.64	$ 3.76	$ 3.71	$ 3.76	$ 3.76	$ 3.69	$ 3.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,063.61	$ 1,048.71	$ 1,044.67	$ 1,029.87	$ 1,063.83	$ 1,048.93	$ 1,063.97	$ 1,063.61	$ 1,045.43	$ 1,049.07
Annual savings in GHG from electricity savings [kg CO2e/year]	82.7	81.5	81.2	80.1	82.7	81.5	82.7	82.7	81.3	81.6
Annual savings in natural gas [m3/year]	153.71	153.71	153.71	153.71	155.21	155.21	156.22	153.71	153.71	156.22
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,424.1	$ 1,438.05	$ 1,438.05	$ 1,447.34	$ 1,424.1	$ 1,424.1	$ 1,447.34
Annual savings in carbon tax for natural gas [$/year]	$ 355.45	$ 355.45	$ 355.45	$ 355.45	$ 358.93	$ 358.93	$ 361.25	$ 355.45	$ 355.45	$ 361.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,779.55	$ 1,796.98	$ 1,796.98	$ 1,808.58	$ 1,779.55	$ 1,779.55	$ 1,808.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	7898.9	7898.9	7898.9	7898.9	7976.2	7976.2	8027.7	7898.9	7898.9	8027.7
Net Present Value [$]	$ 12,102.2	$ 12,146.18	$ 12,257.48	$ 12,303.28	$ 12,317.73	$ 12,361.52	$ 12,394.87	$ 12,398.48	$ 12,408.29	$ 12,438.66
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.	$.	$ 850.

MEDIUM 023WWR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 7,022.96	$ 7,117.15	$ 7,337.89	$ 7,572.96	$ 7,667.15	$ 7,872.96	$ 7,887.89	$ 7,937.89	$ 7,967.15	$ 8,162.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 10,548.49	$ 10,689.96	$ 11,021.51	$ 11,374.59	$ 11,516.06	$ 11,825.19	$ 11,847.61	$ 11,922.71	$ 11,966.66	$ 12,259.65
Net Present Value [$]	$ 10,498.57	$ 10,421.86	$ 10,406.8	$ 10,359.13	$ 10,282.41	$ 10,332.11	$ 10,267.35	$ 12,153.65	$ 10,255.39	$ 8,958.85
Incremental dollars per GHG saving	$ 1.99	$ 2.01	$ 2.05	$ 2.09	$ 2.11	$ 2.13	$ 2.14	$ 1.93	$ 2.16	$ 2.27
Auxiliary Energy Required Heating [GJ/yr]	94.7	94.6	93.8	94.7	94.6	94.7	93.8	94.2	94.6	93.6
Annual Energy DHW [GJ/yr]	27.4	27.3	27.3	25.5	25.5	24.3	25.5	16.5	24.3	27.4
Annual Energy Space Heating [GJ/yr]	100.3	100.2	99.3	100.3	100.2	100.3	99.3	99.7	100.2	99.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7
Total Energy [GJ/yr]	154	154	153.1	152.2	152.1	151	151.3	142.6	150.9	153.9
Design Heating Load [W]	14210	14246.2	14126.3	14210	14246.2	14210	14126.3	13640	14246.2	13404.7
Annual Energy Electricity [kWh/yr]	7838.5	7838.2	7833.8	7838.5	7838.2	7838.5	7833.8	7835.8	7838.2	8086.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,045.83	$ 1,045.79	$ 1,045.17	$ 1,045.83	$ 1,045.79	$ 1,045.83	$ 1,045.17	$ 1,045.45	$ 1,045.79	$ 1,080.92
Annual Energy Natural Gas [m3/yr]	3378.5	3376.5	3353.3	3329.5	3327.5	3296.9	3304.3	3072.5	3294.9	3350.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,457.37	$ 1,456.5	$ 1,446.5	$ 1,436.23	$ 1,435.37	$ 1,422.17	$ 1,425.36	$ 1,325.37	$ 1,421.31	$ 1,445.12
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11719	13069	13339	11720	13070	11721	13340	13342	13071	11467
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131102031	Pkg2131101031	Pkg2121101032
GHGI [kg/m2]	27.97	27.95	27.76	27.57	27.55	27.3	27.36	25.47	27.28	27.74
% ICC	1.3%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	112.2	112.1	111.1	112.2	112.1	112.2	111.1	111.6	112.1	111
Output: MEUI [kWh/(m2 * yr)]	152.2	152.1	151	150	149.9	148.6	148.9	138.7	148.5	152
Output: Better than ERS (%)	2090.0%	2090.0%	2140.0%	2180.0%	2190.0%	2240.0%	2230.0%	2380.0%	2250.0%	2100.0%
Output: Better than Envelope (%)	150.0%	140.0%	50.0%	150.0%	140.0%	150.0%	50.0%	100.0%	140.0%	30.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	810	810	815	810	810	810	815	813	810	562
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 114.24	$ 114.28	$ 114.9	$ 114.24	$ 114.28	$ 114.24	$ 114.9	$ 114.62	$ 114.28	$ 79.27
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 114.64	$ 114.69	$ 115.31	$ 114.64	$ 114.69	$ 114.64	$ 115.31	$ 115.03	$ 114.69	$ 79.55
Annual savings in GHG from electricity savings [kg CO2e/year]	8.9	8.9	9	8.9	8.9	8.9	9	8.9	8.9	6.2
Annual savings in natural gas [m3/year]	68.66	68.74	69.6	70.49	70.56	71.7	71.43	80.06	71.78	69.72
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 636.14	$ 636.83	$ 644.84	$ 653.06	$ 653.75	$ 664.31	$ 661.76	$ 741.77	$ 665.	$ 645.95
Annual savings in carbon tax for natural gas [$/year]	$ 158.78	$ 158.95	$ 160.95	$ 163.	$ 163.17	$ 165.81	$ 165.17	$ 185.14	$ 165.98	$ 161.22
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 794.92	$ 795.78	$ 805.79	$ 816.06	$ 816.92	$ 830.12	$ 826.93	$ 926.92	$ 830.98	$ 807.17
Annual savings in GHG from natural gas savings [kg CO2e/year]	3528.4	3532.2	3576.6	3622.2	3626	3684.6	3670.5	4114.3	3688.5	3582.8
Net Present Value [$]	$ 10,498.57	$ 10,421.86	$ 10,406.8	$ 10,359.13	$ 10,282.41	$ 10,332.11	$ 10,267.35	$ 12,153.65	$ 10,255.39	$ 8,958.85
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$.

MEDIUM 023WWR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 10,772.96	$ 10,172.96	$ 10,867.15	$ 10,267.15	$ 11,087.89	$ 10,487.89	$ 11,322.96	$ 11,417.15	$ 10,722.96	$ 10,817.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,180.99	$ 15,279.79	$ 16,322.46	$ 15,421.26	$ 16,654.01	$ 15,752.81	$ 17,007.09	$ 17,148.56	$ 16,105.89	$ 16,247.36
Net Present Value [$]	$ 12,514.04	$ 14,630.12	$ 12,573.72	$ 14,695.3	$ 12,464.17	$ 14,575.88	$ 12,718.29	$ 12,778.15	$ 14,769.57	$ 14,834.98
Incremental dollars per GHG saving	$ 1.2	$ 1.21	$ 1.21	$ 1.22	$ 1.24	$ 1.25	$ 1.25	$ 1.26	$ 1.26	$ 1.27
Auxiliary Energy Required Heating [GJ/yr]	94.8	94.5	94.8	94.4	93.9	93.6	94.8	94.8	94.5	94.4
Annual Energy DHW [GJ/yr]	16.5	27.4	16.5	27.4	16.5	27.4	14.9	14.9	25.6	25.5
Annual Energy Space Heating [GJ/yr]	62	62.4	62	62.4	61.5	61.9	62	62	62.4	62.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	106	117.3	106	117.2	105.5	116.8	104.5	104.4	115.5	115.4
Design Heating Load [W]	13829.3	14317.1	13865.5	14353.3	13745.6	14233.4	13829.3	13865.5	14317.1	14353.3
Annual Energy Electricity [kWh/yr]	24873	24976.3	24859.6	24966.7	24731.3	24834.6	24875	24861.7	24976.3	24966.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,456.21	$ 3,470.83	$ 3,454.32	$ 3,469.47	$ 3,436.16	$ 3,450.78	$ 3,456.5	$ 3,454.62	$ 3,470.83	$ 3,469.47
Annual Energy Natural Gas [m3/yr]	442.6	735.1	442.6	734.6	442.6	734.6	400.7	400.7	686.1	685.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 317.1	$ 190.92	$ 316.88	$ 190.92	$ 316.88	$ 172.85	$ 172.85	$ 295.96	$ 295.74
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11731	11728	13081	13078	13351	13348	11732	13082	11729	13079
Upgrade Package List	Pkg2121102031	Pkg2121102031	Pkg2131101031	Pkg2131101031	Pkg2131102031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2131101031
GHGI [kg/m2]	4.78	7.18	4.78	7.17	4.78	7.17	4.44	4.44	6.78	6.77
% ICC	2.1%	1.9%	2.1%	2.0%	2.1%	2.0%	2.2%	2.2%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	112.4	112	112.3	111.9	111.3	110.9	112.4	112.3	112	111.9
Output: MEUI [kWh/(m2 * yr)]	95.1	108.4	95	108.4	94.5	107.8	93.2	93.2	106.3	106.2
Output: Better than ERS (%)	4170.0%	3800.0%	4170.0%	3810.0%	4190.0%	3830.0%	4250.0%	4250.0%	3900.0%	3900.0%
Output: Better than Envelope (%)	160.0%	130.0%	160.0%	120.0%	60.0%	30.0%	160.0%	160.0%	130.0%	120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16224	16328	16211	16318	16083	16186	16226	16213	16328	16318
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,287.63	$ 2,302.19	$ 2,285.74	$ 2,300.84	$ 2,267.65	$ 2,282.21	$ 2,287.91	$ 2,286.03	$ 2,302.19	$ 2,300.84
Annual savings in carbon tax for electricity [$/year]	$ 8.11	$ 8.16	$ 8.11	$ 8.16	$ 8.04	$ 8.09	$ 8.11	$ 8.11	$ 8.16	$ 8.16
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,295.74	$ 2,310.36	$ 2,293.84	$ 2,309.	$ 2,275.69	$ 2,290.3	$ 2,296.02	$ 2,294.14	$ 2,310.36	$ 2,309.
Annual savings in GHG from electricity savings [kg CO2e/year]	178.5	179.6	178.3	179.5	176.9	178	178.5	178.3	179.6	179.5
Annual savings in natural gas [m3/year]	178.05	167.15	178.05	167.17	178.05	167.17	179.61	179.61	168.98	169
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,649.63	$ 1,548.65	$ 1,649.63	$ 1,548.83	$ 1,649.63	$ 1,548.83	$ 1,664.09	$ 1,664.09	$ 1,565.57	$ 1,565.74
Annual savings in carbon tax for natural gas [$/year]	$ 411.74	$ 386.54	$ 411.74	$ 386.58	$ 411.74	$ 386.58	$ 415.35	$ 415.35	$ 390.76	$ 390.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,061.36	$ 1,935.19	$ 2,061.36	$ 1,935.41	$ 2,061.36	$ 1,935.41	$ 2,079.44	$ 2,079.44	$ 1,956.33	$ 1,956.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	9149.8	8589.7	9149.8	8590.7	9149.8	8590.7	9230	9230	8683.5	8684.5
Net Present Value [$]	$ 12,514.04	$ 14,630.12	$ 12,573.72	$ 14,695.3	$ 12,464.17	$ 14,575.88	$ 12,718.29	$ 12,778.15	$ 14,769.57	$ 14,834.98
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	8.78	10.51	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15	$ 2,934.15
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 550.

MEDIUM 023WWR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,765.18	$ 8,985.92	$ 9,080.11	$ 9,300.85	$ 9,315.18	$ 9,535.92	$ 7,937.89	$ 9,615.18	$ 9,835.92	$ 9,630.11
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 13,165.3	$ 13,496.85	$ 13,638.33	$ 13,969.88	$ 13,991.4	$ 14,322.95	$ 11,922.71	$ 14,442.	$ 14,773.55	$ 14,464.43
Net Present Value [$]	$ 12,391.77	$ 12,376.71	$ 12,294.9	$ 12,280.56	$ 12,188.33	$ 12,174.	$ 12,153.65	$ 12,119.57	$ 12,105.24	$ 12,091.46
Incremental dollars per GHG saving	$ 2.01	$ 2.04	$ 2.06	$ 2.09	$ 2.1	$ 2.13	$ 1.93	$ 2.14	$ 2.17	$ 2.15
Auxiliary Energy Required Heating [GJ/yr]	89.9	89	89	88.1	89.9	89	94.2	89.9	89	89
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	14.9	16.5	13.9	13.9	14.9
Annual Energy Space Heating [GJ/yr]	95.2	94.3	94.2	93.4	95.2	94.3	99.7	95.2	94.3	94.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	138.1	137.2	137.1	136.3	136.5	135.6	142.6	135.5	134.6	135.6
Design Heating Load [W]	13242.8	13122.9	13159.1	13039.2	13242.8	13122.9	13640	13242.8	13122.9	13159.1
Annual Energy Electricity [kWh/yr]	7813.1	7808.7	7808.4	7804	7813.2	7808.8	7835.8	7813.2	7808.8	7808.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,042.24	$ 1,041.62	$ 1,041.57	$ 1,040.95	$ 1,042.25	$ 1,041.63	$ 1,045.45	$ 1,042.25	$ 1,041.63	$ 1,041.59
Annual Energy Natural Gas [m3/yr]	2952.3	2929.1	2927.7	2904.4	2910.9	2887.6	3072.5	2883.3	2860	2886.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,273.52	$ 1,263.51	$ 1,262.91	$ 1,252.86	$ 1,255.66	$ 1,245.61	$ 1,325.37	$ 1,243.76	$ 1,233.7	$ 1,245.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17824	18094	20956	21226	17825	18095	13342	17826	18096	20957
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221101031	Pkg2221102031	Pkg2131102031	Pkg2221101031	Pkg2221102031	Pkg2231101031
GHGI [kg/m2]	24.48	24.29	24.28	24.09	24.14	23.95	25.47	23.92	23.73	23.94
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.5%	1.8%	1.9%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	106.5	105.5	105.4	104.4	106.5	105.5	111.6	106.5	105.5	105.5
Output: MEUI [kWh/(m2 * yr)]	133.3	132.2	132.2	131.1	131.4	130.4	138.7	130.2	129.2	130.3
Output: Better than ERS (%)	2620.0%	2670.0%	2680.0%	2720.0%	2710.0%	2760.0%	2380.0%	2760.0%	2810.0%	2760.0%
Output: Better than Envelope (%)	360.0%	460.0%	460.0%	560.0%	360.0%	460.0%	100.0%	360.0%	460.0%	460.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	836	840	840	845	836	840	813	836	840	840
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 117.82	$ 118.44	$ 118.48	$ 119.1	$ 117.81	$ 118.43	$ 114.62	$ 117.81	$ 118.43	$ 118.47
Annual savings in carbon tax for electricity [$/year]	$ .42	$ .42	$ .42	$ .42	$ .42	$ .42	$ .41	$ .42	$ .42	$ .42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 118.24	$ 118.86	$ 118.9	$ 119.53	$ 118.22	$ 118.85	$ 115.03	$ 118.22	$ 118.85	$ 118.89
Annual savings in GHG from electricity savings [kg CO2e/year]	9.2	9.2	9.2	9.3	9.2	9.2	8.9	9.2	9.2	9.2
Annual savings in natural gas [m3/year]	84.54	85.4	85.46	86.33	86.08	86.95	80.06	87.11	87.98	87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 783.27	$ 791.28	$ 791.76	$ 799.8	$ 797.56	$ 805.6	$ 741.77	$ 807.09	$ 815.13	$ 806.05
Annual savings in carbon tax for natural gas [$/year]	$ 195.5	$ 197.5	$ 197.62	$ 199.63	$ 199.07	$ 201.07	$ 185.14	$ 201.45	$ 203.45	$ 201.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 978.77	$ 988.78	$ 989.38	$ 999.43	$ 996.63	$ 1,006.68	$ 926.92	$ 1,008.53	$ 1,018.58	$ 1,007.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	4344.4	4388.9	4391.5	4436.2	4423.7	4468.3	4114.3	4476.6	4521.2	4470.8
Net Present Value [$]	$ 12,391.77	$ 12,376.71	$ 12,294.9	$ 12,280.56	$ 12,188.33	$ 12,174.	$ 12,153.65	$ 12,119.57	$ 12,105.24	$ 12,091.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 4,297.11	$ 2,934.15	$ 4,297.11	$ 4,297.11	$ 4,297.11
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$ 550.

MEDIUM 023WWR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75
Total increase in construction cost [$]	$ 16,480.53	$ 16,516.2	$ 16,701.27	$ 16,795.46	$ 16,838.02	$ 16,941.41	$ 16,977.08	$ 17,016.2	$ 17,030.53	$ 17,037.85
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,753.76	$ 24,807.33	$ 25,085.31	$ 25,226.78	$ 25,290.71	$ 25,446.	$ 25,499.57	$ 25,558.33	$ 25,579.86	$ 25,590.85
Net Present Value [$]	$ 13,001.73	$ 12,637.31	$ 12,875.98	$ 12,931.66	$ 12,884.26	$ 13,462.61	$ 13,098.19	$ 12,833.42	$ 13,141.41	$ 13,217.15
Incremental dollars per GHG saving	$ 1.95	$ 1.96	$ 1.98	$ 1.99	$ 1.99	$ 2.01	$ 2.01	$ 2.02	$ 2.	$ 2.02
Auxiliary Energy Required Heating [GJ/yr]	74.6	74	73.7	73.7	73.8	74.6	74	72.9	74.6	74.2
Annual Energy DHW [GJ/yr]	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	25.6	27.4
Annual Energy Space Heating [GJ/yr]	50.2	49.7	49.7	49.7	49.5	50.2	49.7	49.2	50.2	49.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	106.2	105.6	105.7	105.7	105.6	106.2	105.6	105.2	104.4	105.7
Design Heating Load [W]	11426.5	11273.3	11306.6	11342.8	11286.5	11426.5	11273.3	11222.9	11426.5	11335
Annual Energy Electricity [kWh/yr]	21889.8	21737.1	21754.9	21741.9	21706	21889.8	21737.1	21617.7	21889.8	21760.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,034.09	$ 3,012.48	$ 3,015.	$ 3,013.16	$ 3,008.08	$ 3,034.09	$ 3,012.48	$ 2,995.59	$ 3,034.09	$ 3,015.81
Annual Energy Natural Gas [m3/yr]	736.3	735.5	736.4	735.8	736.1	736.3	735.5	735.9	687.3	735.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 317.61	$ 317.27	$ 317.66	$ 317.4	$ 317.53	$ 317.61	$ 317.27	$ 317.44	$ 296.48	$ 317.14
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43462	45604	43678	45406	43876	44110	46252	45622	43463	47332
Upgrade Package List	Pkg3321201034	Pkg3331202033	Pkg3321202034	Pkg3331201034	Pkg3321203033	Pkg3321301034	Pkg3331302033	Pkg3331202034	Pkg3321201034	Pkg3341201033
GHGI [kg/m2]	7.04	7.03	7.04	7.03	7.03	7.04	7.03	7.03	6.64	7.03
% ICC	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	88.4	87.7	87.4	87.4	87.4	88.4	87.7	86.4	88.4	88
Output: MEUI [kWh/(m2 * yr)]	95.3	94.6	94.7	94.6	94.5	95.3	94.6	94.1	93.1	94.7
Output: Better than ERS (%)	4390.0%	4420.0%	4420.0%	4420.0%	4420.0%	4390.0%	4420.0%	4440.0%	4480.0%	4420.0%
Output: Better than Envelope (%)	2000.0%	2070.0%	2100.0%	2100.0%	2090.0%	2000.0%	2070.0%	2190.0%	2000.0%	2050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13241	13088	13106	13093	13057	13241	13088	12969	13241	13112
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,867.	$ 1,845.46	$ 1,847.97	$ 1,846.14	$ 1,841.08	$ 1,867.	$ 1,845.46	$ 1,828.63	$ 1,867.	$ 1,848.78
Annual savings in carbon tax for electricity [$/year]	$ 6.62	$ 6.54	$ 6.55	$ 6.55	$ 6.53	$ 6.62	$ 6.54	$ 6.48	$ 6.62	$ 6.56
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,873.62	$ 1,852.01	$ 1,854.53	$ 1,852.69	$ 1,847.61	$ 1,873.62	$ 1,852.01	$ 1,835.11	$ 1,873.62	$ 1,855.33
Annual savings in GHG from electricity savings [kg CO2e/year]	145.7	144	144.2	144	143.6	145.7	144	142.7	145.7	144.2
Annual savings in natural gas [m3/year]	167.11	167.14	167.1	167.12	167.11	167.11	167.14	167.12	168.93	167.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,548.24	$ 1,548.52	$ 1,548.2	$ 1,548.41	$ 1,548.31	$ 1,548.24	$ 1,548.52	$ 1,548.38	$ 1,565.15	$ 1,548.62
Annual savings in carbon tax for natural gas [$/year]	$ 386.43	$ 386.5	$ 386.42	$ 386.48	$ 386.45	$ 386.43	$ 386.5	$ 386.47	$ 390.66	$ 386.53
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,934.67	$ 1,935.02	$ 1,934.63	$ 1,934.89	$ 1,934.76	$ 1,934.67	$ 1,935.02	$ 1,934.85	$ 1,955.81	$ 1,935.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	8587.4	8588.9	8587.2	8588.4	8587.8	8587.4	8588.9	8588.2	8681.2	8589.5
Net Present Value [$]	$ 13,001.73	$ 12,637.31	$ 12,875.98	$ 12,931.66	$ 12,884.26	$ 13,462.61	$ 13,098.19	$ 12,833.42	$ 13,141.41	$ 13,217.15
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	14.09	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.

MEDIUM 023WWR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC Effr25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 17,116.2	$ 17,301.27	$ 17,395.46	$ 17,438.02	$ 17,666.2	$ 17,577.08	$ 16,480.53	$ 17,616.2	$ 16,516.2	$ 17,637.85
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,708.53	$ 25,986.51	$ 26,127.98	$ 26,191.91	$ 26,534.63	$ 26,400.77	$ 24,753.76	$ 26,459.53	$ 24,807.33	$ 26,492.05
Net Present Value [$]	$ 10,503.83	$ 10,730.72	$ 10,778.35	$ 10,755.72	$ 10,707.9	$ 10,964.71	$ 13,001.73	$ 10,699.28	$ 12,637.31	$ 11,081.72
Incremental dollars per GHG saving	$ 1.9	$ 1.92	$ 1.93	$ 1.94	$ 1.94	$ 1.95	$ 1.95	$ 1.96	$ 1.96	$ 1.96
Auxiliary Energy Required Heating [GJ/yr]	74.4	74.1	74.1	74.1	74.4	74.4	74.6	73.3	74	74.6
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	27.4	16.5	27.4	16.5
Annual Energy Space Heating [GJ/yr]	49.4	49.5	49.4	49.3	49.4	49.4	50.2	49	49.7	49.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	94.3	94.4	94.3	94.2	92.8	94.3	106.2	93.9	105.6	94.4
Design Heating Load [W]	10804.4	10837.7	10873.8	10817.6	10804.4	10804.4	11426.5	10753.9	11273.3	10866.1
Annual Energy Electricity [kWh/yr]	21628.3	21644.5	21626.4	21601.1	21630.2	21628.3	21889.8	21510	21737.1	21650.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,997.09	$ 2,999.38	$ 2,996.82	$ 2,993.24	$ 2,997.36	$ 2,997.09	$ 3,034.09	$ 2,980.35	$ 3,012.48	$ 3,000.17
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	400.7	442.6	736.3	442.6	735.5	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 317.61	$ 190.92	$ 317.27	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	45607	43681	45409	43879	45608	46255	43462	45625	45604	47335
Upgrade Package List	Pkg3331202033	Pkg3321202034	Pkg3331201034	Pkg3321203033	Pkg3331202033	Pkg3331302033	Pkg3321201034	Pkg3331202034	Pkg3331202033	Pkg3341201033
GHGI [kg/m2]	4.63	4.63	4.63	4.63	4.29	4.63	7.04	4.62	7.03	4.63
% ICC	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.2%	3.4%	3.2%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	88.1	87.8	87.8	87.9	88.2	88.1	88.4	86.8	87.7	88.4
Output: MEUI [kWh/(m2 * yr)]	81.2	81.3	81.2	81.1	79.4	81.2	95.3	80.7	94.6	81.3
Output: Better than ERS (%)	4810.0%	4800.0%	4810.0%	4820.0%	4890.0%	4810.0%	4390.0%	4830.0%	4420.0%	4800.0%
Output: Better than Envelope (%)	2030.0%	2060.0%	2060.0%	2060.0%	2030.0%	2030.0%	2000.0%	2140.0%	2070.0%	2000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12980	12996	12978	12952	12982	12980	13241	12861	13088	13001
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,830.12	$ 1,832.41	$ 1,829.86	$ 1,826.29	$ 1,830.39	$ 1,830.12	$ 1,867.	$ 1,813.44	$ 1,845.46	$ 1,833.2
Annual savings in carbon tax for electricity [$/year]	$ 6.49	$ 6.5	$ 6.49	$ 6.48	$ 6.49	$ 6.49	$ 6.62	$ 6.43	$ 6.54	$ 6.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,836.61	$ 1,838.91	$ 1,836.34	$ 1,832.76	$ 1,836.88	$ 1,836.61	$ 1,873.62	$ 1,819.87	$ 1,852.01	$ 1,839.7
Annual savings in GHG from electricity savings [kg CO2e/year]	142.8	143	142.8	142.5	142.8	142.8	145.7	141.5	144	143
Annual savings in natural gas [m3/year]	178.05	178.05	178.05	178.05	179.61	178.05	167.11	178.05	167.14	178.05
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,649.63	$ 1,649.63	$ 1,649.63	$ 1,649.63	$ 1,664.09	$ 1,649.63	$ 1,548.24	$ 1,649.63	$ 1,548.52	$ 1,649.63
Annual savings in carbon tax for natural gas [$/year]	$ 411.74	$ 411.74	$ 411.74	$ 411.74	$ 415.35	$ 411.74	$ 386.43	$ 411.74	$ 386.5	$ 411.74
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,061.36	$ 2,061.36	$ 2,061.36	$ 2,061.36	$ 2,079.44	$ 2,061.36	$ 1,934.67	$ 2,061.36	$ 1,935.02	$ 2,061.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	9149.8	9149.8	9149.8	9149.8	9230	9149.8	8587.4	9149.8	8588.9	9149.8
Net Present Value [$]	$ 10,503.83	$ 10,730.72	$ 10,778.35	$ 10,755.72	$ 10,707.9	$ 10,964.71	$ 13,001.73	$ 10,699.28	$ 12,637.31	$ 11,081.72
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	14.09	10.51	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR80	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2	$ 2,083.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 229.23	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 544.16	$ 544.16	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

MEDIUM 023WWR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 22,474.53	$ 22,695.27	$ 22,789.46	$ 23,010.2	$ 23,024.53	$ 23,245.27	$ 22,255.27	$ 22,974.53	$ 23,195.27	$ 23,324.53
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,756.74	$ 34,088.3	$ 34,229.77	$ 34,561.32	$ 34,582.84	$ 34,914.4	$ 33,427.42	$ 34,507.74	$ 34,839.3	$ 35,033.44
Net Present Value [$]	$ 4,676.77	$ 4,657.95	$ 4,569.95	$ 4,550.16	$ 4,473.88	$ 4,455.24	$ 4,453.49	$ 4,448.71	$ 4,429.88	$ 4,404.94
Incremental dollars per GHG saving	$ 3.88	$ 3.89	$ 3.91	$ 3.92	$ 3.92	$ 3.93	$ 3.91	$ 3.93	$ 3.94	$ 3.94
Auxiliary Energy Required Heating [GJ/yr]	63	62.2	62.2	61.3	63	62.2	64.8	61.9	61.1	63
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	14.9	16.5	16.5	16.5	13.9
Annual Energy Space Heating [GJ/yr]	66.7	65.9	65.8	65	66.7	65.9	68.6	65.6	64.7	66.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	110.5	109.7	109.7	108.8	109	108.1	112.4	109.4	108.5	108
Design Heating Load [W]	9573.2	9453.3	9489.5	9369.6	9573.2	9453.3	9688.8	9522.7	9402.8	9573.2
Annual Energy Electricity [kWh/yr]	7924.6	7920.3	7920.2	7915.9	7924.7	7920.4	7934.1	7918.8	7914.5	7924.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,058.02	$ 1,057.41	$ 1,057.39	$ 1,056.78	$ 1,058.03	$ 1,057.42	$ 1,059.36	$ 1,057.2	$ 1,056.59	$ 1,058.04
Annual Energy Natural Gas [m3/yr]	2202.4	2179.6	2178.9	2156.2	2160.9	2138.1	2252.3	2171.7	2148.9	2133.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 950.04	$ 940.2	$ 939.9	$ 930.11	$ 932.14	$ 922.3	$ 971.56	$ 936.8	$ 926.96	$ 920.23
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43546	43762	45490	45706	43547	43763	43744	43564	43780	43548
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3331201053	Pkg3331202053	Pkg3321201053	Pkg3321202053	Pkg3321202052	Pkg3321201054	Pkg3321202054	Pkg3321201053
GHGI [kg/m2]	18.36	18.18	18.17	17.98	18.02	17.84	18.77	18.11	17.92	17.8
% ICC	4.3%	4.3%	4.4%	4.4%	4.4%	4.4%	4.3%	4.4%	4.4%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	74.7	73.7	73.7	72.7	74.7	73.7	76.8	73.4	72.4	74.7
Output: MEUI [kWh/(m2 * yr)]	100.6	99.6	99.6	98.6	98.8	97.8	102.9	99.3	98.2	97.6
Output: Better than ERS (%)	4100.0%	4140.0%	4140.0%	4190.0%	4180.0%	4230.0%	4000.0%	4160.0%	4200.0%	4230.0%
Output: Better than Envelope (%)	3250.0%	3330.0%	3330.0%	3430.0%	3250.0%	3330.0%	3050.0%	3370.0%	3450.0%	3250.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	724	728	728	733	724	728	715	730	734	724
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 102.1	$ 102.7	$ 102.72	$ 103.32	$ 102.08	$ 102.69	$ 100.76	$ 102.92	$ 103.52	$ 102.07
Annual savings in carbon tax for electricity [$/year]	$ .36	$ .36	$ .36	$ .37	$ .36	$ .36	$ .36	$ .36	$ .37	$ .36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 102.46	$ 103.07	$ 103.08	$ 103.69	$ 102.45	$ 103.05	$ 101.12	$ 103.28	$ 103.89	$ 102.43
Annual savings in GHG from electricity savings [kg CO2e/year]	8	8	8	8.1	8	8	7.9	8	8.1	8
Annual savings in natural gas [m3/year]	112.48	113.33	113.36	114.2	114.03	114.88	110.62	113.62	114.47	115.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,042.14	$ 1,050.01	$ 1,050.25	$ 1,058.08	$ 1,056.46	$ 1,064.33	$ 1,024.91	$ 1,052.73	$ 1,060.6	$ 1,065.99
Annual savings in carbon tax for natural gas [$/year]	$ 260.11	$ 262.08	$ 262.14	$ 264.09	$ 263.69	$ 265.65	$ 255.81	$ 262.76	$ 264.72	$ 266.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,302.25	$ 1,312.08	$ 1,312.39	$ 1,322.18	$ 1,320.15	$ 1,329.99	$ 1,280.72	$ 1,315.49	$ 1,325.33	$ 1,332.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	5780.3	5823.9	5825.3	5868.7	5859.7	5903.4	5684.7	5839.1	5882.7	5912.6
Net Present Value [$]	$ 4,676.77	$ 4,657.95	$ 4,569.95	$ 4,550.16	$ 4,473.88	$ 4,455.24	$ 4,453.49	$ 4,448.71	$ 4,429.88	$ 4,404.94
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 229.23	$ 229.23	$ 544.16	$ 544.16	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23	$ 229.23
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$ 850.

MEDIUM 023WWR Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 28,707.83	$ 29,004.11	$ 29,007.83	$ 29,304.11	$ 29,450.22	$ 29,500.22	$ 29,746.5	$ 29,750.22	$ 29,796.5	$ 30,046.5
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,119.16	$ 43,564.17	$ 43,569.76	$ 44,014.77	$ 44,234.23	$ 44,309.33	$ 44,679.24	$ 44,684.83	$ 44,754.34	$ 45,129.84
Net Present Value [$]	$ 16,090.42	$ 16,386.7	$ 16,116.47	$ 16,412.75	$ 16,591.74	$ 14,401.3	$ 16,888.02	$ 16,617.79	$ 14,697.58	$ 16,914.07
Incremental dollars per GHG saving	$ 3.35	$ 3.38	$ 3.36	$ 3.39	$ 3.44	$ 3.26	$ 3.47	$ 3.45	$ 3.3	$ 3.48
Auxiliary Energy Required Heating [GJ/yr]	54.7	54.7	54.7	54.7	54.1	54.7	54.1	54.1	54.7	54.1
Annual Energy DHW [GJ/yr]	25.6	25.6	24.4	24.4	25.6	16.5	25.6	24.4	16.5	24.4
Annual Energy Space Heating [GJ/yr]	37.8	37.8	37.8	37.8	37.4	37.3	37.4	37.4	37.3	37.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	92.2	92.2	91	91	91.8	82.5	91.8	90.6	82.5	90.6
Design Heating Load [W]	9158.8	9158.8	9158.8	9158.8	9100.6	8680.3	9100.6	9100.6	8680.3	9100.6
Annual Energy Electricity [kWh/yr]	18499.2	18499.2	18499.2	18499.2	18406.5	18331.8	18406.5	18406.5	18331.8	18406.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,554.32	$ 2,554.32	$ 2,554.32	$ 2,554.32	$ 2,541.2	$ 2,530.63	$ 2,541.2	$ 2,541.2	$ 2,530.63	$ 2,541.2
Annual Energy Natural Gas [m3/yr]	687.4	687.4	654.7	654.7	687.1	442.6	687.1	654.4	442.6	654.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 296.52	$ 296.52	$ 282.41	$ 282.41	$ 296.39	$ 190.92	$ 296.39	$ 282.29	$ 190.92	$ 282.29
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51797	52085	51798	52086	52373	52375	52661	52374	52663	52662
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4331303054	Pkg4331403054	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341303054	Pkg4341403054	Pkg4341403054
GHGI [kg/m2]	6.48	6.48	6.22	6.22	6.48	4.48	6.48	6.21	4.48	6.21
% ICC	5.5%	5.5%	5.5%	5.6%	5.6%	5.6%	5.7%	5.7%	5.7%	5.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.1	64.8	64.1	64.1	64.8	64.1
Output: MEUI [kWh/(m2 * yr)]	78.6	78.6	77.2	77.2	78.2	67.1	78.2	76.8	67.1	76.8
Output: Better than ERS (%)	5130.0%	5130.0%	5190.0%	5190.0%	5150.0%	5460.0%	5150.0%	5210.0%	5460.0%	5210.0%
Output: Better than Envelope (%)	4140.0%	4140.0%	4140.0%	4140.0%	4200.0%	4140.0%	4200.0%	4200.0%	4140.0%	4200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9850	9850	9850	9850	9758	9683	9758	9758	9683	9758
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,388.92	$ 1,388.92	$ 1,388.92	$ 1,388.92	$ 1,375.85	$ 1,365.32	$ 1,375.85	$ 1,375.85	$ 1,365.32	$ 1,375.85
Annual savings in carbon tax for electricity [$/year]	$ 4.93	$ 4.93	$ 4.93	$ 4.93	$ 4.88	$ 4.84	$ 4.88	$ 4.88	$ 4.84	$ 4.88
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,393.85	$ 1,393.85	$ 1,393.85	$ 1,393.85	$ 1,380.73	$ 1,370.16	$ 1,380.73	$ 1,380.73	$ 1,370.16	$ 1,380.73
Annual savings in GHG from electricity savings [kg CO2e/year]	108.4	108.4	108.4	108.4	107.3	106.5	107.3	107.3	106.5	107.3
Annual savings in natural gas [m3/year]	168.93	168.93	170.15	170.15	168.94	178.05	168.94	170.16	178.05	170.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,565.12	$ 1,565.12	$ 1,576.41	$ 1,576.41	$ 1,565.22	$ 1,649.63	$ 1,565.22	$ 1,576.51	$ 1,649.63	$ 1,576.51
Annual savings in carbon tax for natural gas [$/year]	$ 390.65	$ 390.65	$ 393.46	$ 393.46	$ 390.67	$ 411.74	$ 390.67	$ 393.49	$ 411.74	$ 393.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,955.77	$ 1,955.77	$ 1,969.87	$ 1,969.87	$ 1,955.9	$ 2,061.36	$ 1,955.9	$ 1,970.	$ 2,061.36	$ 1,970.
Annual savings in GHG from natural gas savings [kg CO2e/year]	8681	8681	8743.6	8743.6	8681.6	9149.8	8681.6	8744.2	9149.8	8744.2
Net Present Value [$]	$ 16,090.42	$ 16,386.7	$ 16,116.47	$ 16,412.75	$ 16,591.74	$ 14,401.3	$ 16,888.02	$ 16,617.79	$ 14,697.58	$ 16,914.07
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 544.16	$ 544.16	$ 544.16	$ 544.16	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.

MEDIUM 023WWR Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 29,500.22	$ 30,050.22	$ 29,796.5	$ 30,350.22	$ 30,346.5	$ 30,646.5	$ 28,707.83	$ 29,007.83	$ 29,004.11	$ 29,304.11
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 44,309.33	$ 45,135.43	$ 44,754.34	$ 45,586.03	$ 45,580.44	$ 46,031.04	$ 43,119.16	$ 43,569.76	$ 43,564.17	$ 44,014.77
Net Present Value [$]	$ 14,401.3	$ 14,605.18	$ 14,697.58	$ 14,675.71	$ 14,901.46	$ 14,971.99	$ 16,090.42	$ 16,116.47	$ 16,386.7	$ 16,412.75
Incremental dollars per GHG saving	$ 3.26	$ 3.29	$ 3.3	$ 3.31	$ 3.33	$ 3.34	$ 3.35	$ 3.36	$ 3.38	$ 3.39
Auxiliary Energy Required Heating [GJ/yr]	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7
Annual Energy DHW [GJ/yr]	16.5	14.9	16.5	13.9	14.9	13.9	25.6	24.4	25.6	24.4
Annual Energy Space Heating [GJ/yr]	37.3	37.3	37.3	37.3	37.3	37.3	37.8	37.8	37.8	37.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	82.5	80.9	82.5	79.9	80.9	79.9	92.2	91	92.2	91
Design Heating Load [W]	8680.3	8680.3	8680.3	8680.3	8680.3	8680.3	9158.8	9158.8	9158.8	9158.8
Annual Energy Electricity [kWh/yr]	18331.8	18333.7	18331.8	18335	18333.7	18335	18499.2	18499.2	18499.2	18499.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,530.63	$ 2,530.9	$ 2,530.63	$ 2,531.09	$ 2,530.9	$ 2,531.09	$ 2,554.32	$ 2,554.32	$ 2,554.32	$ 2,554.32
Annual Energy Natural Gas [m3/yr]	442.6	400.7	442.6	372.9	400.7	372.9	687.4	654.7	687.4	654.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 172.85	$ 160.86	$ 296.52	$ 282.41	$ 296.52	$ 282.41
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	52375	52376	52663	52377	52664	52665	51797	51798	52085	52086
Upgrade Package List	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4331303054	Pkg4331303054	Pkg4331403054	Pkg4331403054
GHGI [kg/m2]	4.48	4.13	4.48	3.91	4.13	3.91	6.48	6.22	6.48	6.22
% ICC	5.6%	5.7%	5.7%	5.8%	5.8%	5.9%	5.5%	5.5%	5.5%	5.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8
Output: MEUI [kWh/(m2 * yr)]	67.1	65.3	67.1	64.1	65.3	64.1	78.6	77.2	78.6	77.2
Output: Better than ERS (%)	5460.0%	5550.0%	5460.0%	5600.0%	5550.0%	5600.0%	5130.0%	5190.0%	5130.0%	5190.0%
Output: Better than Envelope (%)	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9683	9685	9683	9686	9685	9686	9850	9850	9850	9850
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,365.32	$ 1,365.58	$ 1,365.32	$ 1,365.77	$ 1,365.58	$ 1,365.77	$ 1,388.92	$ 1,388.92	$ 1,388.92	$ 1,388.92
Annual savings in carbon tax for electricity [$/year]	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.93	$ 4.93	$ 4.93	$ 4.93
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,370.16	$ 1,370.43	$ 1,370.16	$ 1,370.61	$ 1,370.43	$ 1,370.61	$ 1,393.85	$ 1,393.85	$ 1,393.85	$ 1,393.85
Annual savings in GHG from electricity savings [kg CO2e/year]	106.5	106.5	106.5	106.5	106.5	106.5	108.4	108.4	108.4	108.4
Annual savings in natural gas [m3/year]	178.05	179.61	178.05	180.65	179.61	180.65	168.93	170.15	168.93	170.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,649.63	$ 1,664.09	$ 1,649.63	$ 1,673.69	$ 1,664.09	$ 1,673.69	$ 1,565.12	$ 1,576.41	$ 1,565.12	$ 1,576.41
Annual savings in carbon tax for natural gas [$/year]	$ 411.74	$ 415.35	$ 411.74	$ 417.74	$ 415.35	$ 417.74	$ 390.65	$ 393.46	$ 390.65	$ 393.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,061.36	$ 2,079.44	$ 2,061.36	$ 2,091.43	$ 2,079.44	$ 2,091.43	$ 1,955.77	$ 1,969.87	$ 1,955.77	$ 1,969.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	9149.8	9230	9149.8	9283.2	9230	9283.2	8681	8743.6	8681	8743.6
Net Present Value [$]	$ 14,401.3	$ 14,605.18	$ 14,697.58	$ 14,675.71	$ 14,901.46	$ 14,971.99	$ 16,090.42	$ 16,116.47	$ 16,386.7	$ 16,412.75
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 544.16	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.

MEDIUM 023WWR Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k	medium 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 29,500.22	$ 30,050.22	$ 30,350.22	$ 29,796.5	$ 30,346.5	$ 30,646.5	$ 28,707.83	$ 29,007.83	$ 29,004.11	$ 29,304.11
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Net Present Value [$]	$ 14,401.3	$ 14,605.18	$ 14,675.71	$ 14,697.58	$ 14,901.46	$ 14,971.99	$ 16,090.42	$ 16,116.47	$ 16,386.7	$ 16,412.75
Incremental dollars per GHG saving	$ 3.26	$ 3.29	$ 3.31	$ 3.3	$ 3.33	$ 3.34	$ 3.35	$ 3.36	$ 3.38	$ 3.39
Auxiliary Energy Required Heating [GJ/yr]	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7	54.7
Annual Energy DHW [GJ/yr]	16.5	14.9	13.9	16.5	14.9	13.9	25.6	24.4	25.6	24.4
Annual Energy Space Heating [GJ/yr]	37.3	37.3	37.3	37.3	37.3	37.3	37.8	37.8	37.8	37.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	82.5	80.9	79.9	82.5	80.9	79.9	92.2	91	92.2	91
Design Heating Load [W]	8680.3	8680.3	8680.3	8680.3	8680.3	8680.3	9158.8	9158.8	9158.8	9158.8
Annual Energy Electricity [kWh/yr]	18331.8	18333.7	18335	18331.8	18333.7	18335	18499.2	18499.2	18499.2	18499.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,530.63	$ 2,530.9	$ 2,531.09	$ 2,530.63	$ 2,530.9	$ 2,531.09	$ 2,554.32	$ 2,554.32	$ 2,554.32	$ 2,554.32
Annual Energy Natural Gas [m3/yr]	442.6	400.7	372.9	442.6	400.7	372.9	687.4	654.7	687.4	654.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 172.85	$ 160.86	$ 190.92	$ 172.85	$ 160.86	$ 296.52	$ 282.41	$ 296.52	$ 282.41
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	52375	52376	52377	52663	52664	52665	51797	51798	52085	52086
Upgrade Package List	Pkg4341303054	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4341403054	Pkg4331303054	Pkg4331303054	Pkg4331403054	Pkg4331403054
GHGI [kg/m2]	4.48	4.13	3.91	4.48	4.13	3.91	6.48	6.22	6.48	6.22
% ICC	5.6%	5.7%	5.8%	5.7%	5.8%	5.9%	5.5%	5.5%	5.5%	5.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8
Output: MEUI [kWh/(m2 * yr)]	67.1	65.3	64.1	67.1	65.3	64.1	78.6	77.2	78.6	77.2
Output: Better than ERS (%)	5460.0%	5550.0%	5600.0%	5460.0%	5550.0%	5600.0%	5130.0%	5190.0%	5130.0%	5190.0%
Output: Better than Envelope (%)	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%	4140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9683	9685	9686	9683	9685	9686	9850	9850	9850	9850
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,365.32	$ 1,365.58	$ 1,365.77	$ 1,365.32	$ 1,365.58	$ 1,365.77	$ 1,388.92	$ 1,388.92	$ 1,388.92	$ 1,388.92
Annual savings in carbon tax for electricity [$/year]	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.84	$ 4.93	$ 4.93	$ 4.93	$ 4.93
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,370.16	$ 1,370.43	$ 1,370.61	$ 1,370.16	$ 1,370.43	$ 1,370.61	$ 1,393.85	$ 1,393.85	$ 1,393.85	$ 1,393.85
Annual savings in GHG from electricity savings [kg CO2e/year]	106.5	106.5	106.5	106.5	106.5	106.5	108.4	108.4	108.4	108.4
Annual savings in natural gas [m3/year]	178.05	179.61	180.65	178.05	179.61	180.65	168.93	170.15	168.93	170.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,649.63	$ 1,664.09	$ 1,673.69	$ 1,649.63	$ 1,664.09	$ 1,673.69	$ 1,565.12	$ 1,576.41	$ 1,565.12	$ 1,576.41
Annual savings in carbon tax for natural gas [$/year]	$ 411.74	$ 415.35	$ 417.74	$ 411.74	$ 415.35	$ 417.74	$ 390.65	$ 393.46	$ 390.65	$ 393.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,061.36	$ 2,079.44	$ 2,091.43	$ 2,061.36	$ 2,079.44	$ 2,091.43	$ 1,955.77	$ 1,969.87	$ 1,955.77	$ 1,969.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	9149.8	9230	9283.2	9149.8	9230	9283.2	8681	8743.6	8681	8743.6
Net Present Value [$]	$ 14,401.3	$ 14,605.18	$ 14,675.71	$ 14,697.58	$ 14,901.46	$ 14,971.99	$ 16,090.42	$ 16,116.47	$ 16,386.7	$ 16,412.75
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2	$ 11,127.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75	$ 5,205.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 1,286.55	$ 544.16	$ 544.16	$ 544.16	$ 544.16
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.

MEDIUM 25SAR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>8CGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 9,675.26	$ 9,910.12	$ 10,004.65	$ 10,130.73	$ 10,206.73	$ 10,225.26	$ 10,304.65	$ 10,460.12	$ 10,525.26	$ 10,680.73
ICC with multiplier (Van=1.0,this Cz =1)	$ 9,675.26	$ 9,910.12	$ 10,004.65	$ 10,130.73	$ 10,206.73	$ 10,225.26	$ 10,304.65	$ 10,460.12	$ 10,525.26	$ 10,680.73
Net Present Value [$]	$ 5,131.01	$ 5,316.96	$ 5,087.18	$ 5,456.94	$ 1,808.73	$ 5,226.43	$ 5,095.1	$ 5,412.38	$ 5,233.99	$ 5,552.18
Incremental dollars per GHG saving	$ 4.32	$ 4.4	$ 4.47	$ 4.47	$ 5.5	$ 4.54	$ 4.59	$ 4.62	$ 4.65	$ 4.68
Auxiliary Energy Required Heating [GJ/yr]	31.5	31.3	31.6	31	27.9	31.3	31.4	31.1	31.1	30.7
Annual Energy DHW [GJ/yr]	7.8	7.8	7.3	7.8	11.7	7.3	6.9	7.3	6.9	7.3
Annual Energy Space Heating [GJ/yr]	33.4	33.2	33.5	32.8	29.5	33.1	33.3	32.9	33	32.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.5	67.3	67.1	67	67.6	66.7	66.6	66.5	66.2	66.2
Design Heating Load [W]	6884.7	6874.7	6939.1	6820.4	6700	6884.7	6939.1	6874.7	6884.7	6820.4
Annual Energy Electricity [kWh/yr]	9663.6	9661.5	9509.5	9660.1	7472.6	9508.1	9409.7	9506	9408.2	9504.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,304.08	$ 1,303.79	$ 1,282.28	$ 1,303.59	$ 994.06	$ 1,282.08	$ 1,268.16	$ 1,281.78	$ 1,267.95	$ 1,281.59
Annual Energy Natural Gas [m3/yr]	879.7	874.5	882.5	865.3	1093	873.2	878.3	868	869	858.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 379.47	$ 377.23	$ 380.68	$ 373.26	$ 471.48	$ 376.67	$ 378.87	$ 374.42	$ 374.86	$ 370.46
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	117133	118483	116864	118753	118752	117134	116865	118484	117135	118754
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031
GHGI [kg/m2]	7.64	7.6	7.66	7.52	9.28	7.58	7.62	7.54	7.54	7.46
% ICC	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	37.3	37.1	37.4	36.7	33	37	37.3	36.8	36.9	36.4
Output: MEUI [kWh/(m2 * yr)]	49.7	49.4	49.2	49	49.7	48.7	48.5	48.5	48.1	48.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1250.0%	1310.0%	1220.0%	1390.0%	2250.0%	1310.0%	1280.0%	1360.0%	1360.0%	1470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2081	2079	1927	2078	110	1926	1827	1923	1826	1922
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 293.42	$ 293.12	$ 271.69	$ 292.93	$ 15.51	$ 271.5	$ 257.62	$ 271.2	$ 257.41	$ 271.
Annual savings in carbon tax for electricity [$/year]	$ 1.04	$ 1.04	$ .96	$ 1.04	$ .06	$ .96	$ .91	$ .96	$ .91	$ .96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 294.46	$ 294.16	$ 272.66	$ 293.97	$ 15.56	$ 272.46	$ 258.53	$ 272.16	$ 258.32	$ 271.96
Annual savings in GHG from electricity savings [kg CO2e/year]	22.9	22.9	21.2	22.9	1.2	21.2	20.1	21.2	20.1	21.1
Annual savings in natural gas [m3/year]	44.04	44.24	43.94	44.58	36.1	44.29	44.1	44.48	44.44	44.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 408.07	$ 409.86	$ 407.1	$ 413.04	$ 334.43	$ 410.31	$ 408.55	$ 412.1	$ 411.76	$ 415.28
Annual savings in carbon tax for natural gas [$/year]	$ 101.85	$ 102.3	$ 101.61	$ 103.09	$ 83.47	$ 102.41	$ 101.97	$ 102.86	$ 102.77	$ 103.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 509.92	$ 512.16	$ 508.71	$ 516.13	$ 417.91	$ 512.72	$ 510.52	$ 514.96	$ 514.53	$ 518.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	2263.4	2273.3	2258	2290.9	1855	2275.8	2266	2285.8	2283.8	2303.4
Net Present Value [$]	$ 5,131.01	$ 5,316.96	$ 5,087.18	$ 5,456.94	$ 1,808.73	$ 5,226.43	$ 5,095.1	$ 5,412.38	$ 5,233.99	$ 5,552.18
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.

MEDIUM 25SAR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,604.65	$ 12,825.26	$ 13,060.12	$ 13,154.65	$ 13,280.73	$ 13,375.26	$ 13,454.65	$ 13,610.12	$ 13,675.26	$ 11,330.65
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,604.65	$ 12,825.26	$ 13,060.12	$ 13,154.65	$ 13,280.73	$ 13,375.26	$ 13,454.65	$ 13,610.12	$ 13,675.26	$ 11,330.65
Net Present Value [$]	$ 9,104.94	$ 9,262.38	$ 9,440.27	$ 9,205.05	$ 9,598.07	$ 9,362.31	$ 9,215.66	$ 9,540.2	$ 9,373.27	$ 5,103.46
Incremental dollars per GHG saving	$ 3.24	$ 3.3	$ 3.36	$ 3.38	$ 3.41	$ 3.44	$ 3.46	$ 3.5	$ 3.51	$ 3.52
Auxiliary Energy Required Heating [GJ/yr]	31.7	31.4	31.2	31.5	30.9	31.2	31.3	31	31	30.7
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.8	7.3	6.9	7.3	6.9	13.5
Annual Energy Space Heating [GJ/yr]	11.1	11	10.9	11	10.9	10.9	11	10.9	10.9	10.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	46.6	46.5	46.4	45.9	46.3	45.8	45.5	45.8	45.4	52
Design Heating Load [W]	6985	6930.7	6920.6	6985	6866.3	6930.7	6985	6920.6	6930.7	7241.1
Annual Energy Electricity [kWh/yr]	12931.5	12906.9	12884.8	12756.7	12860.4	12732.1	12644.3	12710	12619.8	10693.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,766.49	$ 1,763.01	$ 1,759.88	$ 1,741.76	$ 1,756.43	$ 1,738.28	$ 1,725.85	$ 1,735.15	$ 1,722.39	$ 1,449.87
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116872	117142	118492	116873	118762	117143	116874	118493	117144	107149
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg1121101031
GHGI [kg/m2]	0.61	0.61	0.6	0.6	0.6	0.6	0.59	0.6	0.59	3.46
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	37.6	37.2	37	37.3	36.6	36.9	37.1	36.7	36.7	36.4
Output: MEUI [kWh/(m2 * yr)]	24.7	24.6	24.5	23.9	24.4	23.8	23.4	23.7	23.3	31.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1190.0%	1280.0%	1330.0%	1250.0%	1420.0%	1330.0%	1310.0%	1390.0%	1390.0%	1470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5349	5324	5302	5174	5278	5150	5062	5127	5037	3111
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 754.19	$ 750.73	$ 747.61	$ 729.55	$ 744.17	$ 726.08	$ 713.7	$ 722.96	$ 710.25	$ 438.69
Annual savings in carbon tax for electricity [$/year]	$ 2.67	$ 2.66	$ 2.65	$ 2.59	$ 2.64	$ 2.57	$ 2.53	$ 2.56	$ 2.52	$ 1.56
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 756.87	$ 753.39	$ 750.26	$ 732.14	$ 746.81	$ 728.65	$ 716.23	$ 725.53	$ 712.76	$ 440.25
Annual savings in GHG from electricity savings [kg CO2e/year]	58.8	58.6	58.3	56.9	58.1	56.6	55.7	56.4	55.4	34.2
Annual savings in natural gas [m3/year]	76.82	76.82	76.82	76.82	76.82	76.82	76.82	76.82	76.82	63.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 711.74	$ 586.74
Annual savings in carbon tax for natural gas [$/year]	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 177.65	$ 146.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 889.39	$ 733.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	3947.7	3947.7	3947.7	3947.7	3947.7	3947.7	3947.7	3947.7	3947.7	3254.4
Net Present Value [$]	$ 9,104.94	$ 9,262.38	$ 9,440.27	$ 9,205.05	$ 9,598.07	$ 9,362.31	$ 9,215.66	$ 9,540.2	$ 9,373.27	$ 5,103.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

MEDIUM 25SAR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 10,206.73	$ 10,686.57	$ 10,907.18	$ 11,236.57	$ 10,736.57	$ 11,142.04	$ 11,457.18	$ 11,536.57	$ 10,957.18	$ 11,036.57
ICC with multiplier (Van=1.0,this Cz =1)	$ 10,206.73	$ 10,686.57	$ 10,907.18	$ 11,236.57	$ 10,736.57	$ 11,142.04	$ 11,457.18	$ 11,536.57	$ 10,957.18	$ 11,036.57
Net Present Value [$]	$ 1,808.73	$ 1,979.67	$ 2,119.71	$ 2,287.51	$ 2,299.17	$ 2,309.31	$ 2,427.55	$ 2,431.92	$ 2,439.2	$ 2,444.36
Incremental dollars per GHG saving	$ 5.5	$ 5.57	$ 5.64	$ 5.69	$ 5.76	$ 5.73	$ 5.76	$ 5.74	$ 5.83	$ 5.81
Auxiliary Energy Required Heating [GJ/yr]	27.9	25	24.7	25	27.1	24.5	24.7	25	26.8	27.1
Annual Energy DHW [GJ/yr]	11.7	13.5	13.5	12.4	12.4	13.5	12.4	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	29.5	26.5	26.1	26.5	28.7	26	26.2	26.5	28.3	28.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	67.6	66.3	66	65.3	67.5	65.8	64.9	64.6	67.1	66.8
Design Heating Load [W]	6700	6369.1	6314.8	6369.1	6744	6304.7	6314.8	6369.1	6689.7	6744
Annual Energy Electricity [kWh/yr]	7472.6	7457.4	7455.7	7457.4	7468.4	7454.7	7455.7	7457.5	7466.7	7468.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 994.06	$ 991.91	$ 991.67	$ 991.91	$ 993.46	$ 991.53	$ 991.67	$ 991.92	$ 993.22	$ 993.46
Annual Energy Natural Gas [m3/yr]	1093	1060.8	1051.7	1031.9	1089.6	1046.6	1022.8	1013.3	1080.5	1071.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 471.48	$ 457.59	$ 453.67	$ 445.13	$ 470.02	$ 451.47	$ 441.2	$ 437.1	$ 466.09	$ 462.04
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	118752	123232	123502	123233	112001	126364	123503	123234	112271	112002
Upgrade Package List	Pkg2131102031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg1221101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg1221102031	Pkg1221101031
GHGI [kg/m2]	9.28	9.02	8.94	8.78	9.25	8.9	8.7	8.63	9.18	9.1
% ICC	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	33	29.6	29.3	29.7	32.1	29	29.3	29.7	31.7	32.1
Output: MEUI [kWh/(m2 * yr)]	49.7	48.3	47.9	47	49.6	47.6	46.6	46.2	49.2	48.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2250.0%	3060.0%	3140.0%	3060.0%	2470.0%	3190.0%	3140.0%	3060.0%	2560.0%	2470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	110	125	127	125	114	128	127	125	116	114
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 15.51	$ 17.65	$ 17.89	$ 17.65	$ 16.1	$ 18.03	$ 17.89	$ 17.64	$ 16.34	$ 16.1
Annual savings in carbon tax for electricity [$/year]	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 15.56	$ 17.72	$ 17.96	$ 17.72	$ 16.16	$ 18.1	$ 17.96	$ 17.7	$ 16.4	$ 16.16
Annual savings in GHG from electricity savings [kg CO2e/year]	1.2	1.4	1.4	1.4	1.3	1.4	1.4	1.4	1.3	1.3
Annual savings in natural gas [m3/year]	36.1	37.3	37.64	38.37	36.22	37.83	38.71	39.07	36.56	36.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 334.43	$ 345.55	$ 348.69	$ 355.53	$ 335.61	$ 350.45	$ 358.67	$ 361.95	$ 338.75	$ 341.99
Annual savings in carbon tax for natural gas [$/year]	$ 83.47	$ 86.25	$ 87.03	$ 88.74	$ 83.77	$ 87.47	$ 89.52	$ 90.34	$ 84.55	$ 85.36
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 417.91	$ 431.8	$ 435.72	$ 444.26	$ 419.37	$ 437.92	$ 448.19	$ 452.29	$ 423.3	$ 427.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	1855	1916.6	1934	1971.9	1861.5	1943.8	1989.4	2007.6	1878.9	1896.9
Net Present Value [$]	$ 1,808.73	$ 1,979.67	$ 2,119.71	$ 2,287.51	$ 2,299.17	$ 2,309.31	$ 2,427.55	$ 2,431.92	$ 2,439.2	$ 2,444.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$.	$ 550.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.

MEDIUM 25SAR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 11,230.65	$ 11,451.26	$ 11,686.12	$ 11,780.65	$ 11,830.65	$ 11,906.73	$ 12,001.26	$ 12,051.26	$ 12,080.65	$ 12,088.22
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,230.65	$ 11,451.26	$ 11,686.12	$ 11,780.65	$ 11,830.65	$ 11,906.73	$ 12,001.26	$ 12,051.26	$ 12,080.65	$ 12,088.22
Net Present Value [$]	$ 6,249.88	$ 6,409.68	$ 6,587.83	$ 6,514.28	$ 5,028.32	$ 6,743.68	$ 6,673.36	$ 5,229.76	$ 6,630.84	$ 7,459.96
Incremental dollars per GHG saving	$ 4.16	$ 4.24	$ 4.33	$ 4.26	$ 3.67	$ 4.41	$ 4.34	$ 3.74	$ 4.3	$ 4.48
Auxiliary Energy Required Heating [GJ/yr]	26.6	26.3	26.1	26.6	28.6	25.8	26.3	28.3	26.6	28.6
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.4	13.5	23.7	22.4	13.5	21.6	23.7
Annual Energy Space Heating [GJ/yr]	9.4	9.3	9.2	9.4	10.1	9.1	9.3	10	9.4	10.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	60.7	60.6	60.6	59.5	51.2	60.5	59.4	51.2	58.6	61.2
Design Heating Load [W]	6985	6930.7	6920.6	6985	6863.4	6866.3	6930.7	6809.1	6985	6866.3
Annual Energy Electricity [kWh/yr]	10286.2	10262.3	10241.6	10286.2	10470.5	10216.1	10262.3	10463	10286.2	10423.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,392.18	$ 1,388.8	$ 1,385.87	$ 1,392.18	$ 1,418.26	$ 1,382.26	$ 1,388.8	$ 1,417.2	$ 1,392.18	$ 1,411.65
Annual Energy Natural Gas [m3/yr]	636.2	636.3	635.9	602.1	362.1	636	602.1	362.1	580.2	636
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.43	$ 274.48	$ 274.31	$ 259.72	$ 156.2	$ 274.35	$ 259.72	$ 156.2	$ 250.28	$ 274.35
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	116866	117136	118486	116867	116869	118756	117137	117139	116868	118702
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2131102021
GHGI [kg/m2]	5.68	5.68	5.68	5.4	3.45	5.67	5.4	3.45	5.22	5.68
% ICC	2.1%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.5	31.2	30.9	31.5	33.9	30.6	31.2	33.5	31.5	33.9
Output: MEUI [kWh/(m2 * yr)]	41.5	41.4	41.3	40	30.1	41.1	39.9	30.1	39	42.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2610.0%	2690.0%	2750.0%	2610.0%	2060.0%	2830.0%	2690.0%	2140.0%	2610.0%	2060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2704	2680	2659	2704	2888	2634	2680	2880	2704	2841
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 381.21	$ 377.84	$ 374.92	$ 381.21	$ 407.19	$ 371.32	$ 377.84	$ 406.14	$ 381.21	$ 400.61
Annual savings in carbon tax for electricity [$/year]	$ 1.35	$ 1.34	$ 1.33	$ 1.35	$ 1.44	$ 1.32	$ 1.34	$ 1.44	$ 1.35	$ 1.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 382.56	$ 379.18	$ 376.25	$ 382.56	$ 408.64	$ 372.64	$ 379.18	$ 407.58	$ 382.56	$ 402.03
Annual savings in GHG from electricity savings [kg CO2e/year]	29.7	29.5	29.2	29.7	31.8	29	29.5	31.7	29.7	31.3
Annual savings in natural gas [m3/year]	53.12	53.11	53.13	54.39	63.33	53.12	54.39	63.33	55.2	53.12
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 492.12	$ 492.09	$ 492.23	$ 503.89	$ 586.74	$ 492.19	$ 503.89	$ 586.74	$ 511.45	$ 492.19
Annual savings in carbon tax for natural gas [$/year]	$ 122.83	$ 122.82	$ 122.86	$ 125.77	$ 146.45	$ 122.85	$ 125.77	$ 146.45	$ 127.66	$ 122.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 614.95	$ 614.91	$ 615.08	$ 629.66	$ 733.19	$ 615.04	$ 629.66	$ 733.19	$ 639.11	$ 615.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	2729.6	2729.4	2730.2	2794.9	3254.4	2730	2794.9	3254.4	2836.8	2730
Net Present Value [$]	$ 6,249.88	$ 6,409.68	$ 6,587.83	$ 6,514.28	$ 5,028.32	$ 6,743.68	$ 6,673.36	$ 5,229.76	$ 6,630.84	$ 7,459.96
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 2,056.84
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$.

MEDIUM 25SAR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 11,830.65	$ 12,051.26	$ 14,610.57	$ 12,380.65	$ 14,831.18	$ 12,286.12	$ 14,860.12	$ 12,680.65	$ 12,601.26	$ 15,066.04
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,830.65	$ 12,051.26	$ 14,610.57	$ 12,380.65	$ 14,831.18	$ 12,286.12	$ 14,860.12	$ 12,680.65	$ 12,601.26	$ 15,066.04
Net Present Value [$]	$ 5,028.32	$ 5,229.76	$ 10,215.65	$ 5,336.65	$ 10,363.04	$ 5,374.78	$ 11,399.12	$ 5,481.42	$ 5,537.72	$ 10,552.62
Incremental dollars per GHG saving	$ 3.67	$ 3.74	$ 3.75	$ 3.78	$ 3.81	$ 3.81	$ 3.82	$ 3.83	$ 3.84	$ 3.87
Auxiliary Energy Required Heating [GJ/yr]	28.6	28.3	28	28.6	27.6	28.1	28.8	28.6	28.3	27.5
Annual Energy DHW [GJ/yr]	13.5	13.5	7.8	12.4	7.8	13.5	7.8	11.7	12.4	7.8
Annual Energy Space Heating [GJ/yr]	10.1	10	9.8	10.1	9.7	9.9	10.2	10.1	10	9.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7	0.7	0.7
Total Energy [GJ/yr]	51.2	51.2	45.3	50.1	45.2	51	46.6	49.4	50.1	45.1
Design Heating Load [W]	6863.4	6809.1	6535.4	6863.4	6481	6799	6394.6	6863.4	6809.1	6471
Annual Energy Electricity [kWh/yr]	10470.5	10463	12583.7	10471.3	12555.3	10428.1	12946.5	10471.8	10463.7	12537.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,418.26	$ 1,417.2	$ 1,717.28	$ 1,418.37	$ 1,713.26	$ 1,412.26	$ 1,768.61	$ 1,418.44	$ 1,417.3	$ 1,710.77
Annual Energy Natural Gas [m3/yr]	362.1	362.1	0	333	0	362.1	0	314.3	333	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$.	$ 143.64	$.	$ 156.2	$.	$ 135.58	$ 143.64	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	116869	117139	123244	116870	123514	118489	118528	116871	117140	126376
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2121101031	Pkg2221102031	Pkg2131101031	Pkg2131101033	Pkg2121101031	Pkg2121102031	Pkg2231101031
GHGI [kg/m2]	3.45	3.45	0.59	3.21	0.59	3.45	0.61	3.06	3.21	0.59
% ICC	2.3%	2.3%	2.8%	2.4%	2.8%	2.4%	2.8%	2.4%	2.4%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33.9	33.5	33.1	33.9	32.8	33.3	34.1	34	33.6	32.6
Output: MEUI [kWh/(m2 * yr)]	30.1	30.1	23.2	28.9	23.1	30	24.7	28	28.8	23
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2060.0%	2140.0%	2220.0%	2060.0%	2330.0%	2190.0%	2000.0%	2060.0%	2140.0%	2360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2888	2880	5001	2889	4973	2846	5364	2889	2881	4955
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 407.19	$ 406.14	$ 705.16	$ 407.31	$ 701.15	$ 401.22	$ 756.31	$ 407.38	$ 406.24	$ 698.67
Annual savings in carbon tax for electricity [$/year]	$ 1.44	$ 1.44	$ 2.5	$ 1.44	$ 2.49	$ 1.42	$ 2.68	$ 1.44	$ 1.44	$ 2.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 408.64	$ 407.58	$ 707.66	$ 408.75	$ 703.64	$ 402.64	$ 758.99	$ 408.82	$ 407.68	$ 701.15
Annual savings in GHG from electricity savings [kg CO2e/year]	31.8	31.7	55	31.8	54.7	31.3	59	31.8	31.7	54.5
Annual savings in natural gas [m3/year]	63.33	63.33	76.82	64.41	76.82	63.33	76.82	65.11	64.41	76.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 586.74	$ 586.74	$ 711.74	$ 596.79	$ 711.74	$ 586.74	$ 711.74	$ 603.24	$ 596.79	$ 711.74
Annual savings in carbon tax for natural gas [$/year]	$ 146.45	$ 146.45	$ 177.65	$ 148.96	$ 177.65	$ 146.45	$ 177.65	$ 150.57	$ 148.96	$ 177.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 733.19	$ 733.19	$ 889.39	$ 745.74	$ 889.39	$ 733.19	$ 889.39	$ 753.81	$ 745.74	$ 889.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	3254.4	3254.4	3947.7	3310.1	3947.7	3254.4	3947.7	3345.9	3310.1	3947.7
Net Present Value [$]	$ 5,028.32	$ 5,229.76	$ 10,215.65	$ 5,336.65	$ 10,363.04	$ 5,374.78	$ 11,399.12	$ 5,481.42	$ 5,537.72	$ 10,552.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	5.28	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.	$.

MEDIUM 25SAR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,830.65	$ 12,051.26	$ 12,380.65	$ 12,286.12	$ 12,680.65	$ 12,601.26	$ 12,506.73	$ 12,901.26	$ 12,836.12	$ 13,136.12
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,830.65	$ 12,051.26	$ 12,380.65	$ 12,286.12	$ 12,680.65	$ 12,601.26	$ 12,506.73	$ 12,901.26	$ 12,836.12	$ 13,136.12
Net Present Value [$]	$ 5,028.32	$ 5,229.76	$ 5,336.65	$ 5,374.78	$ 5,481.42	$ 5,537.72	$ 5,538.24	$ 5,682.49	$ 5,682.57	$ 5,827.34
Incremental dollars per GHG saving	$ 3.67	$ 3.74	$ 3.78	$ 3.81	$ 3.83	$ 3.84	$ 3.88	$ 3.89	$ 3.92	$ 3.96
Auxiliary Energy Required Heating [GJ/yr]	28.6	28.3	28.6	28.1	28.6	28.3	27.8	28.3	28.1	28.1
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	13.5	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	10.1	10	10.1	9.9	10.1	10	9.8	10	9.9	9.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	51.2	51.2	50.1	51	49.4	50.1	50.9	49.4	49.9	49.2
Design Heating Load [W]	6863.4	6809.1	6863.4	6799	6863.4	6809.1	6744.7	6809.1	6799	6799
Annual Energy Electricity [kWh/yr]	10470.5	10463	10471.3	10428.1	10471.8	10463.7	10405.9	10464.2	10428.8	10429.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,418.26	$ 1,417.2	$ 1,418.37	$ 1,412.26	$ 1,418.44	$ 1,417.3	$ 1,409.12	$ 1,417.37	$ 1,412.36	$ 1,412.43
Annual Energy Natural Gas [m3/yr]	362.1	362.1	333	362.1	314.3	333	362.1	314.3	333	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 135.58
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	116869	117139	116870	118489	116871	117140	118759	117141	118490	118491
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2131101031
GHGI [kg/m2]	3.45	3.45	3.21	3.45	3.06	3.45	3.06	3.45	3.21	3.06
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33.9	33.5	33.9	33.3	34	33.6	32.9	33.6	33.3	33.3
Output: MEUI [kWh/(m2 * yr)]	30.1	30.1	28.9	30	28	28.8	29.9	28	28.7	27.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2060.0%	2140.0%	2060.0%	2190.0%	2060.0%	2140.0%	2280.0%	2140.0%	2190.0%	2190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2888	2880	2889	2846	2889	2881	2823	2882	2846	2847
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 407.19	$ 406.14	$ 407.31	$ 401.22	$ 407.38	$ 406.24	$ 398.09	$ 406.31	$ 401.31	$ 401.38
Annual savings in carbon tax for electricity [$/year]	$ 1.44	$ 1.44	$ 1.44	$ 1.42	$ 1.44	$ 1.44	$ 1.41	$ 1.44	$ 1.42	$ 1.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 408.64	$ 407.58	$ 408.75	$ 402.64	$ 408.82	$ 407.68	$ 399.5	$ 407.75	$ 402.74	$ 402.81
Annual savings in GHG from electricity savings [kg CO2e/year]	31.8	31.7	31.8	31.3	31.8	31.7	31.1	31.7	31.3	31.3
Annual savings in natural gas [m3/year]	63.33	63.33	64.41	63.33	65.11	64.41	63.33	65.11	64.41	65.11
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 586.74	$ 586.74	$ 596.79	$ 586.74	$ 603.24	$ 596.79	$ 586.74	$ 603.24	$ 596.79	$ 603.24
Annual savings in carbon tax for natural gas [$/year]	$ 146.45	$ 146.45	$ 148.96	$ 146.45	$ 150.57	$ 148.96	$ 146.45	$ 150.57	$ 148.96	$ 150.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 733.19	$ 733.19	$ 745.74	$ 733.19	$ 753.81	$ 745.74	$ 733.19	$ 753.81	$ 745.74	$ 753.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	3254.4	3254.4	3310.1	3254.4	3345.9	3310.1	3254.4	3345.9	3310.1	3345.9
Net Present Value [$]	$ 5,028.32	$ 5,229.76	$ 5,336.65	$ 5,374.78	$ 5,481.42	$ 5,537.72	$ 5,538.24	$ 5,682.49	$ 5,682.57	$ 5,827.34
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.

MEDIUM 25SAR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 20,107.23	$ 20,243.62	$ 20,288.15	$ 20,568.29	$ 20,657.23	$ 20,704.68	$ 20,743.62	$ 20,749.21	$ 20,793.62	$ 20,838.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,107.23	$ 20,243.62	$ 20,288.15	$ 20,568.29	$ 20,657.23	$ 20,704.68	$ 20,743.62	$ 20,749.21	$ 20,793.62	$ 20,838.15
Net Present Value [$]	$ 11,515.02	$ 11,746.17	$ 11,717.48	$ 11,976.08	$ 11,822.98	$ 12,207.23	$ 12,059.38	$ 12,178.54	$ 12,053.95	$ 12,025.45
Incremental dollars per GHG saving	$ 6.23	$ 6.27	$ 6.28	$ 6.37	$ 6.29	$ 6.41	$ 6.42	$ 6.42	$ 6.33	$ 6.34
Auxiliary Energy Required Heating [GJ/yr]	17.7	18	17.8	17.7	17.7	18	17.3	17.8	18	17.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5	12.4	12.4
Annual Energy Space Heating [GJ/yr]	6.3	6.5	6.4	6.3	6.3	6.5	6.2	6.4	6.5	6.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	48.7	48.8	48.7	48.7	47.6	48.8	48.5	48.7	47.7	47.6
Design Heating Load [W]	5249	5239.9	5281.4	5249	5249	5239.9	5217	5281.4	5239.9	5281.4
Annual Energy Electricity [kWh/yr]	9775.2	9812	9783.6	9775.2	9775.9	9812	9739.5	9783.6	9812.7	9784.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,319.88	$ 1,325.08	$ 1,321.06	$ 1,319.88	$ 1,319.97	$ 1,325.08	$ 1,314.82	$ 1,321.06	$ 1,325.18	$ 1,321.16
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	333	362.1	362.1	362.1	333	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 143.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	151033	151231	149305	151681	151034	151879	151249	149953	151232	149306
Upgrade Package List	Pkg3331202034	Pkg3331203033	Pkg3321203034	Pkg3331302034	Pkg3331202034	Pkg3331303033	Pkg3331203034	Pkg3321303034	Pkg3331203033	Pkg3321203034
GHGI [kg/m2]	3.42	3.42	3.42	3.42	3.18	3.42	3.41	3.42	3.18	3.18
% ICC	3.8%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21	21.3	21.1	21	21	21.3	20.5	21.1	21.3	21.1
Output: MEUI [kWh/(m2 * yr)]	27.2	27.3	27.2	27.2	25.9	27.3	27	27.2	26	25.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5080.0%	5000.0%	5060.0%	5080.0%	5080.0%	5000.0%	5190.0%	5060.0%	5000.0%	5060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2193	2229	2201	2193	2193	2229	2157	2201	2230	2202
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 309.16	$ 314.35	$ 310.34	$ 309.16	$ 309.26	$ 314.35	$ 304.12	$ 310.34	$ 314.44	$ 310.44
Annual savings in carbon tax for electricity [$/year]	$ 1.1	$ 1.11	$ 1.1	$ 1.1	$ 1.1	$ 1.11	$ 1.08	$ 1.1	$ 1.12	$ 1.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 310.25	$ 315.46	$ 311.44	$ 310.25	$ 310.35	$ 315.46	$ 305.2	$ 311.44	$ 315.56	$ 311.54
Annual savings in GHG from electricity savings [kg CO2e/year]	24.1	24.5	24.2	24.1	24.1	24.5	23.7	24.2	24.5	24.2
Annual savings in natural gas [m3/year]	63.33	63.33	63.33	63.33	64.41	63.33	63.33	63.33	64.41	64.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 586.74	$ 586.74	$ 586.74	$ 586.74	$ 596.79	$ 586.74	$ 586.74	$ 586.74	$ 596.79	$ 596.79
Annual savings in carbon tax for natural gas [$/year]	$ 146.45	$ 146.45	$ 146.45	$ 146.45	$ 148.96	$ 146.45	$ 146.45	$ 146.45	$ 148.96	$ 148.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 733.19	$ 733.19	$ 733.19	$ 733.19	$ 745.74	$ 733.19	$ 733.19	$ 733.19	$ 745.74	$ 745.74
Annual savings in GHG from natural gas savings [kg CO2e/year]	3254.4	3254.4	3254.4	3254.4	3310.1	3254.4	3254.4	3254.4	3310.1	3310.1
Net Present Value [$]	$ 11,515.02	$ 11,746.17	$ 11,717.48	$ 11,976.08	$ 11,822.98	$ 12,207.23	$ 12,059.38	$ 12,178.54	$ 12,053.95	$ 12,025.45
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	14.09	10.51	10.51	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 787.	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 550.

MEDIUM 25SAR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 20,107.23	$ 20,243.62	$ 20,288.15	$ 20,657.23	$ 20,957.23	$ 20,793.62	$ 20,838.15	$ 21,093.62	$ 21,138.15	$ 20,568.29
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,107.23	$ 20,243.62	$ 20,288.15	$ 20,657.23	$ 20,957.23	$ 20,793.62	$ 20,838.15	$ 21,093.62	$ 21,138.15	$ 20,568.29
Net Present Value [$]	$ 11,515.02	$ 11,746.17	$ 11,717.48	$ 11,822.98	$ 11,967.39	$ 12,053.95	$ 12,025.45	$ 12,198.72	$ 12,170.22	$ 11,976.08
Incremental dollars per GHG saving	$ 6.23	$ 6.27	$ 6.28	$ 6.29	$ 6.31	$ 6.33	$ 6.34	$ 6.35	$ 6.36	$ 6.37
Auxiliary Energy Required Heating [GJ/yr]	17.7	18	17.8	17.7	17.8	18	17.8	18	17.8	17.7
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	11.7	12.4	12.4	11.7	11.7	13.5
Annual Energy Space Heating [GJ/yr]	6.3	6.5	6.4	6.3	6.3	6.5	6.4	6.5	6.4	6.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	48.7	48.8	48.7	47.6	46.9	47.7	47.6	47	46.9	48.7
Design Heating Load [W]	5249	5239.9	5281.4	5249	5249	5239.9	5281.4	5239.9	5281.4	5249
Annual Energy Electricity [kWh/yr]	9775.2	9812	9783.6	9775.9	9776.3	9812.7	9784.3	9813.2	9784.8	9775.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,319.88	$ 1,325.08	$ 1,321.06	$ 1,319.97	$ 1,320.03	$ 1,325.18	$ 1,321.16	$ 1,325.25	$ 1,321.23	$ 1,319.88
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	333	314.3	333	333	314.3	314.3	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 135.58	$ 143.64	$ 143.64	$ 135.58	$ 135.58	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	151033	151231	149305	151034	151035	151232	149306	151233	149307	151681
Upgrade Package List	Pkg3331202034	Pkg3331203033	Pkg3331203034	Pkg3331202034	Pkg3331202034	Pkg3331203033	Pkg3331203034	Pkg3331203033	Pkg3331203034	Pkg3331302034
GHGI [kg/m2]	3.42	3.42	3.42	3.18	3.03	3.18	3.18	3.03	3.03	3.42
% ICC	3.8%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21	21.3	21.1	21	21	21.3	21.1	21.4	21.1	21
Output: MEUI [kWh/(m2 * yr)]	27.2	27.3	27.2	25.9	25	26	25.9	25.2	25.1	27.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5080.0%	5000.0%	5060.0%	5080.0%	5060.0%	5000.0%	5060.0%	5000.0%	5060.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2193	2229	2201	2193	2194	2230	2202	2231	2202	2193
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 309.16	$ 314.35	$ 310.34	$ 309.26	$ 309.31	$ 314.44	$ 310.44	$ 314.51	$ 310.51	$ 309.16
Annual savings in carbon tax for electricity [$/year]	$ 1.1	$ 1.11	$ 1.1	$ 1.1	$ 1.1	$ 1.12	$ 1.1	$ 1.12	$ 1.1	$ 1.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 310.25	$ 315.46	$ 311.44	$ 310.35	$ 310.41	$ 315.56	$ 311.54	$ 315.63	$ 311.61	$ 310.25
Annual savings in GHG from electricity savings [kg CO2e/year]	24.1	24.5	24.2	24.1	24.1	24.5	24.2	24.5	24.2	24.1
Annual savings in natural gas [m3/year]	63.33	63.33	63.33	64.41	65.11	64.41	64.41	65.11	65.11	63.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 586.74	$ 586.74	$ 586.74	$ 596.79	$ 603.24	$ 596.79	$ 596.79	$ 603.24	$ 603.24	$ 586.74
Annual savings in carbon tax for natural gas [$/year]	$ 146.45	$ 146.45	$ 146.45	$ 148.96	$ 150.57	$ 148.96	$ 148.96	$ 150.57	$ 150.57	$ 146.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 733.19	$ 733.19	$ 733.19	$ 745.74	$ 753.81	$ 745.74	$ 745.74	$ 753.81	$ 753.81	$ 733.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	3254.4	3254.4	3254.4	3310.1	3345.9	3310.1	3310.1	3345.9	3345.9	3254.4
Net Present Value [$]	$ 11,515.02	$ 11,746.17	$ 11,717.48	$ 11,822.98	$ 11,967.39	$ 12,053.95	$ 12,025.45	$ 12,198.72	$ 12,170.22	$ 11,976.08
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	14.09	10.51	10.51	14.09	14.09	14.09	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$.

MEDIUM 25SAR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 20,107.23	$ 20,288.15	$ 20,243.62	$ 20,657.23	$ 20,957.23	$ 20,568.29	$ 20,838.15	$ 20,793.62	$ 20,743.62	$ 21,138.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,107.23	$ 20,288.15	$ 20,243.62	$ 20,657.23	$ 20,957.23	$ 20,568.29	$ 20,838.15	$ 20,793.62	$ 20,743.62	$ 21,138.15
Net Present Value [$]	$ 11,515.02	$ 11,717.48	$ 11,746.17	$ 11,822.98	$ 11,967.39	$ 11,976.08	$ 12,025.45	$ 12,053.95	$ 12,059.38	$ 12,170.22
Incremental dollars per GHG saving	$ 6.23	$ 6.28	$ 6.27	$ 6.29	$ 6.31	$ 6.37	$ 6.34	$ 6.33	$ 6.42	$ 6.36
Auxiliary Energy Required Heating [GJ/yr]	17.7	17.8	18	17.7	17.8	17.7	17.8	18	17.3	17.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	11.7	13.5	12.4	12.4	13.5	11.7
Annual Energy Space Heating [GJ/yr]	6.3	6.4	6.5	6.3	6.3	6.3	6.4	6.5	6.2	6.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	48.7	48.7	48.8	47.6	46.9	48.7	47.6	47.7	48.5	46.9
Design Heating Load [W]	5249	5281.4	5239.9	5249	5249	5249	5281.4	5239.9	5217	5281.4
Annual Energy Electricity [kWh/yr]	9775.2	9783.6	9812	9775.9	9776.3	9775.2	9784.3	9812.7	9739.5	9784.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,319.88	$ 1,321.06	$ 1,325.08	$ 1,319.97	$ 1,320.03	$ 1,319.88	$ 1,321.16	$ 1,325.18	$ 1,314.82	$ 1,321.23
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	333	314.3	362.1	333	333	362.1	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 135.58	$ 156.2	$ 143.64	$ 143.64	$ 156.2	$ 135.58
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	151033	149305	151231	151034	151035	151681	149306	151232	151249	149307
Upgrade Package List	Pkg3331202034	Pkg3321203034	Pkg3331203033	Pkg3331202034	Pkg3331202034	Pkg3331302034	Pkg3321203034	Pkg3331203033	Pkg3331203034	Pkg3321203034
GHGI [kg/m2]	3.42	3.42	3.42	3.18	3.03	3.42	3.18	3.18	3.41	3.03
% ICC	3.8%	3.9%	3.9%	4.0%	4.0%	3.9%	4.0%	4.0%	4.0%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	21	21.1	21.3	21	21	21	21.1	21.3	20.5	21.1
Output: MEUI [kWh/(m2 * yr)]	27.2	27.2	27.3	25.9	25	27.2	25.9	26	27	25.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5080.0%	5060.0%	5000.0%	5080.0%	5060.0%	5080.0%	5060.0%	5000.0%	5190.0%	5060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2193	2201	2229	2193	2194	2193	2202	2230	2157	2202
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 309.16	$ 310.34	$ 314.35	$ 309.26	$ 309.31	$ 309.16	$ 310.44	$ 314.44	$ 304.12	$ 310.51
Annual savings in carbon tax for electricity [$/year]	$ 1.1	$ 1.1	$ 1.11	$ 1.1	$ 1.1	$ 1.1	$ 1.1	$ 1.12	$ 1.08	$ 1.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 310.25	$ 311.44	$ 315.46	$ 310.35	$ 310.41	$ 310.25	$ 311.54	$ 315.56	$ 305.2	$ 311.61
Annual savings in GHG from electricity savings [kg CO2e/year]	24.1	24.2	24.5	24.1	24.1	24.1	24.2	24.5	23.7	24.2
Annual savings in natural gas [m3/year]	63.33	63.33	63.33	64.41	65.11	63.33	64.41	64.41	63.33	65.11
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 586.74	$ 586.74	$ 586.74	$ 596.79	$ 603.24	$ 586.74	$ 596.79	$ 596.79	$ 586.74	$ 603.24
Annual savings in carbon tax for natural gas [$/year]	$ 146.45	$ 146.45	$ 146.45	$ 148.96	$ 150.57	$ 146.45	$ 148.96	$ 148.96	$ 146.45	$ 150.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 733.19	$ 733.19	$ 733.19	$ 745.74	$ 753.81	$ 733.19	$ 745.74	$ 745.74	$ 733.19	$ 753.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	3254.4	3254.4	3254.4	3310.1	3345.9	3254.4	3310.1	3310.1	3254.4	3345.9
Net Present Value [$]	$ 11,515.02	$ 11,717.48	$ 11,746.17	$ 11,822.98	$ 11,967.39	$ 11,976.08	$ 12,025.45	$ 12,053.95	$ 12,059.38	$ 12,170.22
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	14.09	10.51	10.51	10.51	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 331.53	$ 787.	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$ 550.	$.	$ 850.

MEDIUM 25SAR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,680.65	$ 8,901.26	$ 9,136.12	$ 9,230.65	$ 9,356.73	$ 9,451.26	$ 9,530.65	$ 9,686.12	$ 9,751.26	$ 9,906.73
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,314.34	$ 9,551.05	$ 9,803.06	$ 9,904.49	$ 10,039.77	$ 10,141.2	$ 10,226.39	$ 10,393.21	$ 10,463.1	$ 10,629.92
Net Present Value [$]	$ 914.38	$ 1,040.16	$ 1,221.87	$ 1,222.22	$ 1,347.41	$ 1,348.	$ 1,367.6	$ 1,529.89	$ 1,492.22	$ 1,655.49
Incremental dollars per GHG saving	$ 5.07	$ 5.14	$ 5.24	$ 5.22	$ 5.3	$ 5.29	$ 5.29	$ 5.38	$ 5.35	$ 5.44
Auxiliary Energy Required Heating [GJ/yr]	38.3	38	37.7	38.3	37.4	38	38.4	37.7	38	37.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	12.4	11.7	12.4	11.7	12.4
Annual Energy Space Heating [GJ/yr]	40.6	40.2	40	40.6	39.6	40.2	40.6	40	40.2	39.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	80.5	80.1	79.8	79.4	79.4	79	78.7	78.8	78.3	78.3
Design Heating Load [W]	8709.3	8640	8632.5	8709.3	8563.2	8640	8709.3	8632.5	8640	8563.2
Annual Energy Electricity [kWh/yr]	7528	7526	7524.8	7528	7522.8	7526	7528.1	7524.9	7526	7522.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,001.9	$ 1,001.61	$ 1,001.44	$ 1,001.9	$ 1,001.16	$ 1,001.61	$ 1,001.91	$ 1,001.46	$ 1,001.61	$ 1,001.16
Annual Energy Natural Gas [m3/yr]	1432.9	1422.2	1416.2	1404	1405.5	1393.3	1385.5	1387.3	1374.7	1376.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 618.1	$ 613.49	$ 610.9	$ 605.64	$ 606.28	$ 601.02	$ 597.66	$ 598.43	$ 593.	$ 593.82
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116860	117130	118480	116861	118750	117131	116862	118481	117132	118751
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2131102031
GHGI [kg/m2]	12.06	11.97	11.92	11.82	11.83	11.73	11.67	11.69	11.58	11.6
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.4	45	44.7	45.4	44.3	45	45.5	44.7	45	44.3
Output: MEUI [kWh/(m2 * yr)]	65	64.5	64.2	63.7	63.8	63.2	62.9	63	62.4	62.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1560.0%	1630.0%	1700.0%	1560.0%	1760.0%	1630.0%	1540.0%	1700.0%	1630.0%	1760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	110	112	113	110	115	112	110	113	112	115
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 15.45	$ 15.74	$ 15.9	$ 15.45	$ 16.19	$ 15.74	$ 15.44	$ 15.89	$ 15.74	$ 16.19
Annual savings in carbon tax for electricity [$/year]	$ .05	$ .06	$ .06	$ .05	$ .06	$ .06	$ .05	$ .06	$ .06	$ .06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 15.51	$ 15.79	$ 15.96	$ 15.51	$ 16.24	$ 15.79	$ 15.49	$ 15.95	$ 15.79	$ 16.24
Annual savings in GHG from electricity savings [kg CO2e/year]	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.3
Annual savings in natural gas [m3/year]	33.29	33.69	33.91	34.37	34.31	34.77	35.06	34.99	35.46	35.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 308.44	$ 312.13	$ 314.2	$ 318.42	$ 317.9	$ 322.11	$ 324.8	$ 324.18	$ 328.53	$ 327.87
Annual savings in carbon tax for natural gas [$/year]	$ 76.99	$ 77.91	$ 78.42	$ 79.48	$ 79.35	$ 80.4	$ 81.07	$ 80.91	$ 82.	$ 81.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 385.42	$ 390.04	$ 392.63	$ 397.89	$ 397.24	$ 402.51	$ 405.87	$ 405.1	$ 410.53	$ 409.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	1710.8	1731.3	1742.8	1766.1	1763.2	1786.6	1801.5	1798.1	1822.2	1818.6
Net Present Value [$]	$ 914.38	$ 1,040.16	$ 1,221.87	$ 1,222.22	$ 1,347.41	$ 1,348.	$ 1,367.6	$ 1,529.89	$ 1,492.22	$ 1,655.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.

MEDIUM 25SAR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,280.73	$ 13,610.12	$ 11,551.26	$ 13,675.26	$ 13,830.73	$ 13,910.12	$ 11,786.12	$ 11,830.65	$ 13,964.65	$ 12,101.26
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 14,250.22	$ 14,603.66	$ 12,394.5	$ 14,673.55	$ 14,840.37	$ 14,925.56	$ 12,646.51	$ 12,694.29	$ 14,984.07	$ 12,984.65
Net Present Value [$]	$ 13,363.78	$ 13,333.47	$ 9,238.4	$ 13,165.82	$ 13,457.31	$ 13,339.69	$ 9,284.47	$ 8,495.49	$ 14,771.28	$ 9,545.82
Incremental dollars per GHG saving	$ 3.04	$ 3.11	$ 3.12	$ 3.13	$ 3.16	$ 3.18	$ 3.18	$ 3.19	$ 3.2	$ 3.22
Auxiliary Energy Required Heating [GJ/yr]	40.6	40.7	40.8	40.8	40.4	40.6	40.6	38.2	40.2	40.8
Annual Energy DHW [GJ/yr]	7.8	7.3	13.5	6.9	7.3	6.9	13.5	13.5	7.8	12.4
Annual Energy Space Heating [GJ/yr]	16.8	16.9	17.1	16.9	16.8	16.8	16.8	15.6	16.7	17.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7
Total Energy [GJ/yr]	54.9	54.4	60.8	54	54.2	53.9	60.5	59.3	55.9	59.7
Design Heating Load [W]	8812.3	8881.7	9287.3	8889.1	8812.3	8881.7	9279.9	8767.9	8423.5	9287.3
Annual Energy Electricity [kWh/yr]	15239	15099.3	13130.2	15008.9	15061.7	14985.2	13056.9	12733.1	15520.1	13131
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,093.	$ 2,073.24	$ 1,794.61	$ 2,060.44	$ 2,067.92	$ 2,057.09	$ 1,784.24	$ 1,738.42	$ 2,132.78	$ 1,794.72
Annual Energy Natural Gas [m3/yr]	0	0	362.1	0	0	0	362.1	362.1	0	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 156.2	$.	$.	$.	$ 156.2	$ 156.2	$.	$ 143.6
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	118762	118493	107419	117144	118763	118494	108769	116869	116890	107420
Upgrade Package List	Pkg2131102031	Pkg2131101031	Pkg1121102031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg1131101031	Pkg2121101031	Pkg2121101032	Pkg1121102031
GHGI [kg/m2]	0.72	0.71	3.57	0.73	0.71	0.7	3.57	3.56	0.73	3.34
% ICC	2.5%	2.6%	2.2%	2.6%	2.6%	2.7%	2.3%	2.3%	2.7%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	48.1	48.3	48.4	48.3	47.8	48.1	48.1	45.3	47.6	48.4
Output: MEUI [kWh/(m2 * yr)]	33.9	33.3	40.9	33	33.2	32.9	40.6	39.2	35.1	39.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1060.0%	1040.0%	1010.0%	1010.0%	1100.0%	1060.0%	1060.0%	1590.0%	1150.0%	1010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7601	7462	5493	7371	7424	7348	5419	5096	7882	5493
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,071.8	$ 1,052.1	$ 774.46	$ 1,039.35	$ 1,046.8	$ 1,036.01	$ 764.12	$ 718.47	$ 1,111.43	$ 774.57
Annual savings in carbon tax for electricity [$/year]	$ 3.8	$ 3.73	$ 2.75	$ 3.69	$ 3.71	$ 3.67	$ 2.71	$ 2.55	$ 3.94	$ 2.75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,075.6	$ 1,055.83	$ 777.2	$ 1,043.04	$ 1,050.51	$ 1,039.69	$ 766.83	$ 721.01	$ 1,115.37	$ 777.32
Annual savings in GHG from electricity savings [kg CO2e/year]	83.6	82.1	60.4	81.1	81.7	80.8	59.6	56.1	86.7	60.4
Annual savings in natural gas [m3/year]	86.68	86.68	73.19	86.68	86.68	86.68	73.19	73.19	86.68	74.28
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 803.08	$ 803.08	$ 678.08	$ 803.08	$ 803.08	$ 803.08	$ 678.08	$ 678.08	$ 803.08	$ 688.16
Annual savings in carbon tax for natural gas [$/year]	$ 200.45	$ 200.45	$ 169.25	$ 200.45	$ 200.45	$ 200.45	$ 169.25	$ 169.25	$ 200.45	$ 171.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,003.53	$ 1,003.53	$ 847.33	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 847.33	$ 847.33	$ 1,003.53	$ 859.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	4454.3	4454.3	3761	4454.3	4454.3	4454.3	3761	3761	4454.3	3816.9
Net Present Value [$]	$ 13,363.78	$ 13,333.47	$ 9,238.4	$ 13,165.82	$ 13,457.31	$ 13,339.69	$ 9,284.47	$ 8,495.49	$ 14,771.28	$ 9,545.82
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	10.51	8.78	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

MEDIUM 25SAR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 8,680.65	$ 8,901.26	$ 9,136.12	$ 9,230.65	$ 9,356.73	$ 9,451.26	$ 9,530.65	$ 9,751.26	$ 9,686.12	$ 9,906.73
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 9,314.34	$ 9,551.05	$ 9,803.06	$ 9,904.49	$ 10,039.77	$ 10,141.2	$ 10,226.39	$ 10,463.1	$ 10,393.21	$ 10,629.92
Net Present Value [$]	$ 914.38	$ 1,040.16	$ 1,221.87	$ 1,222.22	$ 1,347.41	$ 1,348.	$ 1,367.6	$ 1,492.22	$ 1,529.89	$ 1,655.49
Incremental dollars per GHG saving	$ 5.07	$ 5.14	$ 5.24	$ 5.22	$ 5.3	$ 5.29	$ 5.29	$ 5.35	$ 5.38	$ 5.44
Auxiliary Energy Required Heating [GJ/yr]	38.3	38	37.7	38.3	37.4	38	38.4	38	37.7	37.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	12.4	11.7	11.7	12.4	12.4
Annual Energy Space Heating [GJ/yr]	40.6	40.2	40	40.6	39.6	40.2	40.6	40.2	40	39.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	80.5	80.1	79.8	79.4	79.4	79	78.7	78.3	78.8	78.3
Design Heating Load [W]	8709.3	8640	8632.5	8709.3	8563.2	8640	8709.3	8640	8632.5	8563.2
Annual Energy Electricity [kWh/yr]	7528	7526	7524.8	7528	7522.8	7526	7528.1	7526	7524.9	7522.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,001.9	$ 1,001.61	$ 1,001.44	$ 1,001.9	$ 1,001.16	$ 1,001.61	$ 1,001.91	$ 1,001.61	$ 1,001.46	$ 1,001.16
Annual Energy Natural Gas [m3/yr]	1432.9	1422.2	1416.2	1404	1405.5	1393.3	1385.5	1374.7	1387.3	1376.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 618.1	$ 613.49	$ 610.9	$ 605.64	$ 606.28	$ 601.02	$ 597.66	$ 593.	$ 598.43	$ 593.82
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116860	117130	118480	116861	118750	117131	116862	117132	118481	118751
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2131102031
GHGI [kg/m2]	12.06	11.97	11.92	11.82	11.83	11.73	11.67	11.58	11.69	11.6
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.4	45	44.7	45.4	44.3	45	45.5	45	44.7	44.3
Output: MEUI [kWh/(m2 * yr)]	65	64.5	64.2	63.7	63.8	63.2	62.9	62.4	63	62.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1560.0%	1630.0%	1700.0%	1560.0%	1760.0%	1630.0%	1540.0%	1630.0%	1700.0%	1760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	110	112	113	110	115	112	110	112	113	115
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 15.45	$ 15.74	$ 15.9	$ 15.45	$ 16.19	$ 15.74	$ 15.44	$ 15.74	$ 15.89	$ 16.19
Annual savings in carbon tax for electricity [$/year]	$ .05	$ .06	$ .06	$ .05	$ .06	$ .06	$ .05	$ .06	$ .06	$ .06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 15.51	$ 15.79	$ 15.96	$ 15.51	$ 16.24	$ 15.79	$ 15.49	$ 15.79	$ 15.95	$ 16.24
Annual savings in GHG from electricity savings [kg CO2e/year]	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.3
Annual savings in natural gas [m3/year]	33.29	33.69	33.91	34.37	34.31	34.77	35.06	35.46	34.99	35.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 308.44	$ 312.13	$ 314.2	$ 318.42	$ 317.9	$ 322.11	$ 324.8	$ 328.53	$ 324.18	$ 327.87
Annual savings in carbon tax for natural gas [$/year]	$ 76.99	$ 77.91	$ 78.42	$ 79.48	$ 79.35	$ 80.4	$ 81.07	$ 82.	$ 80.91	$ 81.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 385.42	$ 390.04	$ 392.63	$ 397.89	$ 397.24	$ 402.51	$ 405.87	$ 410.53	$ 405.1	$ 409.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	1710.8	1731.3	1742.8	1766.1	1763.2	1786.6	1801.5	1822.2	1798.1	1818.6
Net Present Value [$]	$ 914.38	$ 1,040.16	$ 1,221.87	$ 1,222.22	$ 1,347.41	$ 1,348.	$ 1,367.6	$ 1,492.22	$ 1,529.89	$ 1,655.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

MEDIUM 25SAR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,451.26	$ 11,686.12	$ 11,906.73	$ 12,001.26	$ 12,236.12	$ 12,301.26	$ 12,456.73	$ 12,536.12	$ 12,590.65	$ 12,756.73
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 12,287.2	$ 12,539.21	$ 12,775.92	$ 12,877.35	$ 13,129.36	$ 13,199.25	$ 13,366.07	$ 13,451.26	$ 13,509.77	$ 13,687.97
Net Present Value [$]	$ 9,969.62	$ 10,076.01	$ 10,212.45	$ 10,233.05	$ 10,339.69	$ 10,349.61	$ 10,476.85	$ 10,455.27	$ 11,784.31	$ 10,592.68
Incremental dollars per GHG saving	$ 3.6	$ 3.67	$ 3.74	$ 3.7	$ 3.77	$ 3.74	$ 3.83	$ 3.81	$ 3.96	$ 3.88
Auxiliary Energy Required Heating [GJ/yr]	36.2	36	35.6	36.2	36	36.2	35.6	36	35.2	35.6
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.4	22.4	21.6	22.4	21.6	23.7	21.6
Annual Energy Space Heating [GJ/yr]	15	14.8	14.7	15	14.8	15	14.7	14.8	14.7	14.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7
Total Energy [GJ/yr]	68.9	68.7	68.6	67.6	67.5	66.8	67.3	66.6	69.9	66.5
Design Heating Load [W]	8889.1	8881.7	8812.3	8889.1	8881.7	8889.1	8812.3	8881.7	8423.5	8812.3
Annual Energy Electricity [kWh/yr]	12561	12512.4	12479.7	12561	12512.4	12561	12479.7	12512.4	12822	12479.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,714.07	$ 1,707.19	$ 1,702.56	$ 1,714.07	$ 1,707.19	$ 1,714.07	$ 1,702.56	$ 1,707.19	$ 1,751.	$ 1,702.56
Annual Energy Natural Gas [m3/yr]	636.3	635.9	635.9	602.1	601.7	580.2	601.8	579.7	636.7	579.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.48	$ 274.31	$ 274.31	$ 259.72	$ 259.55	$ 250.28	$ 259.6	$ 250.06	$ 274.65	$ 250.11
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	117136	118486	118756	117137	118487	117138	118757	118488	116884	118758
Upgrade Package List	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2131102031	Pkg2131101031	Pkg2121101032	Pkg2131102031
GHGI [kg/m2]	5.79	5.78	5.78	5.51	5.5	5.33	5.5	5.32	5.8	5.32
% ICC	2.2%	2.2%	2.3%	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.9	42.6	42.2	42.9	42.6	42.9	42.2	42.6	41.8	42.2
Output: MEUI [kWh/(m2 * yr)]	50.6	50.4	50.2	49.1	48.9	48.1	48.7	47.9	51.7	47.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2030.0%	2070.0%	2160.0%	2030.0%	2070.0%	2030.0%	2160.0%	2070.0%	2250.0%	2160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4923	4875	4842	4923	4875	4923	4842	4875	5184	4842
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 694.2	$ 687.35	$ 682.74	$ 694.2	$ 687.35	$ 694.2	$ 682.74	$ 687.35	$ 731.	$ 682.74
Annual savings in carbon tax for electricity [$/year]	$ 2.46	$ 2.44	$ 2.42	$ 2.46	$ 2.44	$ 2.46	$ 2.42	$ 2.44	$ 2.59	$ 2.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 696.66	$ 689.78	$ 685.16	$ 696.66	$ 689.78	$ 696.66	$ 685.16	$ 689.78	$ 733.59	$ 685.16
Annual savings in GHG from electricity savings [kg CO2e/year]	54.2	53.6	53.3	54.2	53.6	54.2	53.3	53.6	57	53.3
Annual savings in natural gas [m3/year]	62.97	62.99	62.99	64.25	64.26	65.06	64.26	65.08	62.96	65.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 583.43	$ 583.57	$ 583.57	$ 595.24	$ 595.37	$ 602.8	$ 595.34	$ 602.97	$ 583.29	$ 602.93
Annual savings in carbon tax for natural gas [$/year]	$ 145.62	$ 145.66	$ 145.66	$ 148.57	$ 148.6	$ 150.45	$ 148.59	$ 150.5	$ 145.59	$ 150.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 729.05	$ 729.22	$ 729.22	$ 743.8	$ 743.98	$ 753.25	$ 743.93	$ 753.47	$ 728.88	$ 753.42
Annual savings in GHG from natural gas savings [kg CO2e/year]	3236	3236.8	3236.8	3301.5	3302.3	3343.4	3302.1	3344.4	3235.3	3344.2
Net Present Value [$]	$ 9,969.62	$ 10,076.01	$ 10,212.45	$ 10,233.05	$ 10,339.69	$ 10,349.61	$ 10,476.85	$ 10,455.27	$ 11,784.31	$ 10,592.68
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$ 850.

MEDIUM 25SAR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,286.65	$ 15,616.04	$ 15,681.18	$ 11,451.26	$ 15,836.65	$ 15,916.04	$ 15,970.57	$ 11,686.12	$ 13,630.65	$ 16,136.65
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 16,402.58	$ 16,756.01	$ 16,825.91	$ 12,287.2	$ 16,992.73	$ 17,077.91	$ 17,136.42	$ 12,539.21	$ 14,625.69	$ 17,314.63
Net Present Value [$]	$ 13,894.23	$ 13,855.52	$ 13,695.9	$ 9,969.62	$ 13,990.68	$ 13,862.48	$ 15,466.6	$ 10,076.01	$ 10,578.32	$ 13,997.64
Incremental dollars per GHG saving	$ 3.49	$ 3.57	$ 3.58	$ 3.6	$ 3.62	$ 3.63	$ 3.65	$ 3.67	$ 3.68	$ 3.68
Auxiliary Energy Required Heating [GJ/yr]	36.1	36.3	36.3	36.2	35.9	36.1	35.7	36	35.6	35.8
Annual Energy DHW [Gj/yr]	7.8	7.3	6.9	23.7	7.3	6.9	7.8	23.7	13.5	6.9
Annual Energy Space Heating [GJ/yr]	14.8	14.9	14.9	15	14.7	14.8	14.8	14.8	14.9	14.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7	1.7	0.7
Total Energy [GJ/yr]	52.8	52.3	52	68.9	52.2	51.9	54	68.7	59.7	51.8
Design Heating Load [W]	8238.7	8308	8315.5	8889.1	8238.7	8308	7849.9	8881.7	8096.8	8238.7
Annual Energy Electricity [kWh/yr]	14665.9	14522.9	14435.6	12561	14489.7	14409.1	15011	12512.4	12843	14375.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,011.91	$ 1,991.68	$ 1,979.32	$ 1,714.07	$ 1,986.98	$ 1,975.57	$ 2,060.74	$ 1,707.19	$ 1,753.97	$ 1,970.87
Annual Energy Natural Gas [m3/yr]	0	0	0	636.3	0	0	0	635.9	362.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 274.48	$.	$.	$.	$ 274.31	$ 156.2	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	126646	126377	123516	117136	126647	126378	123262	118486	116905	126648
Upgrade Package List	Pkg2231102031	Pkg2231101031	Pkg2221102031	Pkg2121102031	Pkg2231102031	Pkg2231101031	Pkg2221101032	Pkg2131101031	Pkg2121101033	Pkg2231102031
GHGI [kg/m2]	0.69	0.68	0.68	5.79	0.68	0.68	0.7	5.78	3.56	0.67
% ICC	2.9%	3.0%	3.0%	2.2%	3.0%	3.0%	3.1%	2.2%	2.6%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.8	43	43.1	42.9	42.5	42.8	42.3	42.6	42.2	42.4
Output: MEUI [kWh/(m2 * yr)]	31.5	30.9	30.5	50.6	30.8	30.4	32.9	50.4	39.7	30.3
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2050.0%	2000.0%	2000.0%	2030.0%	2090.0%	2050.0%	2140.0%	2070.0%	2160.0%	2110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7028	6885	6798	4923	6852	6772	7373	4875	5205	6738
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 990.99	$ 970.83	$ 958.52	$ 694.2	$ 966.15	$ 954.78	$ 1,039.65	$ 687.35	$ 733.96	$ 950.1
Annual savings in carbon tax for electricity [$/year]	$ 3.51	$ 3.44	$ 3.4	$ 2.46	$ 3.43	$ 3.39	$ 3.69	$ 2.44	$ 2.6	$ 3.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 994.5	$ 974.27	$ 961.92	$ 696.66	$ 969.57	$ 958.17	$ 1,043.34	$ 689.78	$ 736.56	$ 953.47
Annual savings in GHG from electricity savings [kg CO2e/year]	77.3	75.7	74.8	54.2	75.4	74.5	81.1	53.6	57.3	74.1
Annual savings in natural gas [m3/year]	86.68	86.68	86.68	62.97	86.68	86.68	86.68	62.99	73.19	86.68
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 803.08	$ 803.08	$ 803.08	$ 583.43	$ 803.08	$ 803.08	$ 803.08	$ 583.57	$ 678.08	$ 803.08
Annual savings in carbon tax for natural gas [$/year]	$ 200.45	$ 200.45	$ 200.45	$ 145.62	$ 200.45	$ 200.45	$ 200.45	$ 145.66	$ 169.25	$ 200.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 729.05	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 729.22	$ 847.33	$ 1,003.53
Annual savings in GHG from natural gas savings [kg CO2e/year]	4454.3	4454.3	4454.3	3236	4454.3	4454.3	4454.3	3236.8	3761	4454.3
Net Present Value [$]	$ 13,894.23	$ 13,855.52	$ 13,695.9	$ 9,969.62	$ 13,990.68	$ 13,862.48	$ 15,466.6	$ 10,076.01	$ 10,578.32	$ 13,997.64
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	10.51	8.78	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 4,318.3	$ 4,318.3	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	HRV sre 75	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$.	$.	$ 850.

MEDIUM 25SAR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,631.15	$ 16,851.76	$ 16,831.15	$ 16,786.62	$ 16,851.76	$ 17,051.76	$ 16,957.23	$ 17,131.15	$ 17,007.23	$ 17,086.62
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,845.22	$ 18,081.94	$ 18,059.82	$ 18,012.04	$ 18,081.94	$ 18,296.54	$ 18,195.11	$ 18,381.72	$ 18,248.76	$ 18,333.94
Net Present Value [$]	$ 6,330.07	$ 6,456.75	$ 6,478.1	$ 6,501.4	$ 6,597.64	$ 6,604.06	$ 6,614.21	$ 6,622.69	$ 6,628.64	$ 6,645.62
Incremental dollars per GHG saving	$ 6.9	$ 6.93	$ 6.96	$ 6.98	$ 7.02	$ 6.99	$ 7.02	$ 6.98	$ 7.01	$ 7.
Auxiliary Energy Required Heating [GJ/yr]	27	26.6	26.1	26.4	27.1	25.7	25.2	26.1	26	26.4
Annual Energy DHW [GJ/yr]	11.7	11.7	12.4	12.4	11.7	12.4	13.5	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	28.5	28.1	27.7	27.9	28.7	27.3	26.7	27.7	27.5	27.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	67.6	67.2	67.4	67.7	67.8	67	67.5	66.7	67.3	67
Design Heating Load [W]	6780.1	6710.8	6751	6703.4	6971.7	6681.6	6604.9	6751	6634.1	6703.4
Annual Energy Electricity [kWh/yr]	7733.9	7731.9	7729.4	7730.9	7734.9	7727.4	7724.4	7729.5	7728.9	7730.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,031.03	$ 1,030.75	$ 1,030.4	$ 1,030.61	$ 1,031.17	$ 1,030.11	$ 1,029.69	$ 1,030.41	$ 1,030.32	$ 1,030.61
Annual Energy Natural Gas [m3/yr]	1067	1056.4	1062.2	1069.8	1072.3	1051.5	1064.9	1043.6	1059.3	1051.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 460.27	$ 455.69	$ 458.2	$ 461.47	$ 462.55	$ 453.58	$ 459.36	$ 450.17	$ 456.95	$ 453.45
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	148848	149064	148865	150791	133530	149081	151024	148866	151007	150792
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3321201034	Pkg3331201033	Pkg3321202034	Pkg3321202034	Pkg3331202034	Pkg3321201034	Pkg3331202033	Pkg3331201033
GHGI [kg/m2]	9.08	8.99	9.04	9.1	9.12	8.95	9.06	8.89	9.02	8.95
% ICC	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.2%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	31.9	31.5	30.9	31.3	32.2	30.5	29.8	30.9	30.8	31.3
Output: MEUI [kWh/(m2 * yr)]	49.7	49.2	49.5	49.8	50	49	49.6	48.7	49.4	49
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	4050.0%	4140.0%	4250.0%	4190.0%	4030.0%	4340.0%	4450.0%	4250.0%	4270.0%	4190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	96	94	92	93	97	90	87	92	91	93
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 13.58	$ 13.3	$ 12.94	$ 13.16	$ 13.72	$ 12.66	$ 12.24	$ 12.96	$ 12.87	$ 13.16
Annual savings in carbon tax for electricity [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .04	$ .04	$ .05	$ .05	$ .05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 13.63	$ 13.34	$ 12.99	$ 13.2	$ 13.77	$ 12.71	$ 12.28	$ 13.	$ 12.92	$ 13.2
Annual savings in GHG from electricity savings [kg CO2e/year]	1.1	1	1	1	1.1	1	1	1	1	1
Annual savings in natural gas [m3/year]	46.92	47.32	47.1	46.82	46.73	47.5	47	47.8	47.21	47.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 434.75	$ 438.41	$ 436.41	$ 433.78	$ 432.92	$ 440.1	$ 435.47	$ 442.83	$ 437.41	$ 440.2
Annual savings in carbon tax for natural gas [$/year]	$ 108.51	$ 109.42	$ 108.93	$ 108.27	$ 108.05	$ 109.85	$ 108.69	$ 110.53	$ 109.17	$ 109.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 543.26	$ 547.83	$ 545.33	$ 542.05	$ 540.98	$ 549.95	$ 544.17	$ 553.36	$ 546.58	$ 550.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	2411.4	2431.7	2420.6	2406	2401.2	2441	2415.4	2456.2	2426.1	2441.6
Net Present Value [$]	$ 6,330.07	$ 6,456.75	$ 6,478.1	$ 6,501.4	$ 6,597.64	$ 6,604.06	$ 6,614.21	$ 6,622.69	$ 6,628.64	$ 6,645.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.

MEDIUM 25SAR Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 26,853.42	$ 27,072.81	$ 27,088.28	$ 27,293.42	$ 27,308.89	$ 27,314.48	$ 27,403.42	$ 27,489.81	$ 27,528.28	$ 27,533.87
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 28,813.72	$ 29,049.13	$ 29,065.72	$ 29,285.84	$ 29,302.44	$ 29,308.44	$ 29,403.87	$ 29,496.57	$ 29,537.84	$ 29,543.84
Net Present Value [$]	$ 20,140.81	$ 20,127.4	$ 20,316.14	$ 20,178.94	$ 20,450.76	$ 20,601.87	$ 20,448.23	$ 20,647.74	$ 20,278.5	$ 20,588.46
Incremental dollars per GHG saving	$ 7.22	$ 7.28	$ 7.28	$ 7.34	$ 7.34	$ 7.34	$ 7.26	$ 7.39	$ 7.4	$ 7.4
Auxiliary Energy Required Heating [GJ/yr]	22.6	21.7	22.4	21.3	22	22.6	22.6	22.1	21.2	21.7
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	9.5	9.1	9.4	8.9	9.3	9.5	9.5	9.3	8.7	9.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	54.6	54.3	54.5	54	54.4	54.6	53.5	54.4	53.8	54.3
Design Heating Load [W]	6208.9	6142.1	6201.5	6072.8	6132.2	6208.9	6208.9	6168.1	6065.3	6142.1
Annual Energy Electricity [kWh/yr]	11421.2	11330.8	11398.1	11265.1	11364.7	11421.2	11422	11370.9	11212.6	11330.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,552.78	$ 1,539.99	$ 1,549.52	$ 1,530.7	$ 1,544.79	$ 1,552.78	$ 1,552.9	$ 1,545.67	$ 1,523.27	$ 1,539.99
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	332.9	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 156.2	$ 156.2	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	149161	148963	150889	149179	151105	149809	149162	149377	150907	149611
Upgrade Package List	Pkg3321202052	Pkg3321201053	Pkg3331201052	Pkg3321202053	Pkg3321202052	Pkg3321302052	Pkg3321202052	Pkg3321203052	Pkg3331201053	Pkg3321301053
GHGI [kg/m2]	3.49	3.49	3.49	3.49	3.49	3.49	3.26	3.49	3.48	3.49
% ICC	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.3%	5.3%	5.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	26.7	25.7	26.5	25.3	26.1	26.7	26.7	26.2	25.1	25.7
Output: MEUI [kWh/(m2 * yr)]	33.6	33.2	33.4	32.9	33.3	33.6	32.3	33.3	32.7	33.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5220.0%	5070.0%	5310.0%	5150.0%	5020.0%	5020.0%	5130.0%	5330.0%	5220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3784	3693	3760	3628	3727	3784	3784	3733	3575	3693
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 533.49	$ 520.74	$ 530.23	$ 511.48	$ 525.52	$ 533.49	$ 533.6	$ 526.4	$ 504.07	$ 520.74
Annual savings in carbon tax for electricity [$/year]	$ 1.89	$ 1.85	$ 1.88	$ 1.81	$ 1.86	$ 1.89	$ 1.89	$ 1.87	$ 1.79	$ 1.85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 535.38	$ 522.59	$ 532.11	$ 513.29	$ 527.38	$ 535.38	$ 535.49	$ 528.26	$ 505.86	$ 522.59
Annual savings in GHG from electricity savings [kg CO2e/year]	41.6	40.6	41.4	39.9	41	41.6	41.6	41.1	39.3	40.6
Annual savings in natural gas [m3/year]	73.19	73.19	73.19	73.19	73.19	73.19	74.28	73.19	73.19	73.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 688.16	$ 678.08	$ 678.08	$ 678.08
Annual savings in carbon tax for natural gas [$/year]	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 171.76	$ 169.25	$ 169.25	$ 169.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 859.93	$ 847.33	$ 847.33	$ 847.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	3761	3761	3761	3761	3761	3761	3816.9	3761	3761	3761
Net Present Value [$]	$ 20,140.81	$ 20,127.4	$ 20,316.14	$ 20,178.94	$ 20,450.76	$ 20,601.87	$ 20,448.23	$ 20,647.74	$ 20,278.5	$ 20,588.46
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	10.51	14.09	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM 25SAR Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 29,659.28	$ 29,872.89	$ 29,983.95	$ 30,028.48	$ 30,053.81	$ 30,096.6	$ 30,120.34	$ 30,164.87	$ 30,209.28	$ 30,280.35
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 31,824.41	$ 32,053.61	$ 32,172.78	$ 32,220.56	$ 32,247.74	$ 32,293.65	$ 32,319.12	$ 32,366.91	$ 32,414.56	$ 32,490.82
Net Present Value [$]	$ 25,495.95	$ 25,083.29	$ 25,821.16	$ 25,795.95	$ 25,292.51	$ 25,948.24	$ 25,957.01	$ 26,031.48	$ 25,594.23	$ 26,117.56
Incremental dollars per GHG saving	$ 6.76	$ 6.8	$ 6.83	$ 6.84	$ 6.84	$ 6.86	$ 6.86	$ 6.87	$ 6.88	$ 6.9
Auxiliary Energy Required Heating [GJ/yr]	22.5	22.6	22.6	22.3	22.7	22.6	22.5	22.7	22.3	22.6
Annual Energy DHW [GJ/yr]	7.8	6.9	7.8	7.8	6.9	7.8	7.8	7.8	7.3	7.8
Annual Energy Space Heating [GJ/yr]	9.5	9.5	9.5	9.4	9.5	9.5	9.5	9.5	9.4	9.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	48.9	48	48.9	48.8	48.1	48.9	48.9	49	48.3	48.9
Design Heating Load [W]	6109	6149.8	5926.8	5974.4	6185.8	6096.4	6109	5962.8	6109	5926.8
Annual Energy Electricity [kWh/yr]	13589.6	13346.3	13589.8	13562.7	13357.3	13595.4	13589.6	13601.2	13414.1	13589.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,859.61	$ 1,825.19	$ 1,859.64	$ 1,855.81	$ 1,826.74	$ 1,860.43	$ 1,859.61	$ 1,861.25	$ 1,834.78	$ 1,859.64
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	151360	151146	157048	156490	149418	153088	152008	156616	151361	157336
Upgrade Package List	Pkg3331203054	Pkg3331202054	Pkg4331302053	Pkg4321302054	Pkg3321203054	Pkg3341202054	Pkg3331303054	Pkg4321303053	Pkg3331203054	Pkg4331402053
GHGI [kg/m2]	0.64	0.63	0.64	0.64	0.63	0.64	0.64	0.64	0.63	0.64
% ICC	5.7%	5.7%	5.7%	5.7%	5.7%	5.8%	5.8%	5.8%	5.8%	5.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	26.6	26.8	26.8	26.5	26.9	26.8	26.6	26.9	26.4	26.8
Output: MEUI [kWh/(m2 * yr)]	26.8	25.8	26.8	26.7	25.8	26.8	26.8	26.9	26.1	26.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5040.0%	5020.0%	5020.0%	5090.0%	5000.0%	5020.0%	5040.0%	5000.0%	5090.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5952	5709	5952	5925	5720	5958	5952	5964	5776	5952
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 839.23	$ 804.93	$ 839.26	$ 835.44	$ 806.48	$ 840.05	$ 839.23	$ 840.87	$ 814.49	$ 839.26
Annual savings in carbon tax for electricity [$/year]	$ 2.98	$ 2.85	$ 2.98	$ 2.96	$ 2.86	$ 2.98	$ 2.98	$ 2.98	$ 2.89	$ 2.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 842.21	$ 807.78	$ 842.24	$ 838.4	$ 809.34	$ 843.03	$ 842.21	$ 843.85	$ 817.37	$ 842.24
Annual savings in GHG from electricity savings [kg CO2e/year]	65.5	62.8	65.5	65.2	62.9	65.5	65.5	65.6	63.5	65.5
Annual savings in natural gas [m3/year]	86.68	86.68	86.68	86.68	86.68	86.68	86.68	86.68	86.68	86.68
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08	$ 803.08
Annual savings in carbon tax for natural gas [$/year]	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45	$ 200.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53	$ 1,003.53
Annual savings in GHG from natural gas savings [kg CO2e/year]	4454.3	4454.3	4454.3	4454.3	4454.3	4454.3	4454.3	4454.3	4454.3	4454.3
Net Present Value [$]	$ 25,495.95	$ 25,083.29	$ 25,821.16	$ 25,795.95	$ 25,292.51	$ 25,948.24	$ 25,957.01	$ 26,031.48	$ 25,594.23	$ 26,117.56
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	10.51	10.51	14.09	10.51	14.09	14.09	14.09	10.51
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 1,860.71	$ 787.	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 55	NA	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$.	$.	$ 850.	$.	$.	$.	$ 550.	$.

MEDIUM 25SAR Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,072.81	$ 26,853.42	$ 27,293.42	$ 27,572.81	$ 27,528.28	$ 27,088.28	$ 27,793.42	$ 27,748.89	$ 27,622.81	$ 27,403.42
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 29,049.13	$ 28,813.72	$ 29,285.84	$ 29,585.63	$ 29,537.84	$ 29,065.72	$ 29,822.34	$ 29,774.56	$ 29,639.28	$ 29,403.87
Net Present Value [$]	$ 20,127.4	$ 20,140.81	$ 20,178.94	$ 20,254.38	$ 20,278.5	$ 20,316.14	$ 20,376.58	$ 20,401.06	$ 20,434.64	$ 20,448.23
Incremental dollars per GHG saving	$ 7.28	$ 7.22	$ 7.34	$ 7.41	$ 7.4	$ 7.28	$ 7.47	$ 7.46	$ 7.32	$ 7.26
Auxiliary Energy Required Heating [GJ/yr]	21.7	22.6	21.3	20.9	21.2	22.4	20.5	20.8	21.7	22.6
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	12.4	12.4
Annual Energy Space Heating [GJ/yr]	9.1	9.5	8.9	8.6	8.7	9.4	8.5	8.6	9.1	9.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	54.3	54.6	54	53.8	53.8	54.5	53.6	53.7	53.2	53.5
Design Heating Load [W]	6142.1	6208.9	6072.8	6112.9	6065.3	6201.5	6043.6	5996	6142.1	6208.9
Annual Energy Electricity [kWh/yr]	11330.8	11421.2	11265.1	11185.9	11212.6	11398.1	11147.7	11174.5	11331.5	11422
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,539.99	$ 1,552.78	$ 1,530.7	$ 1,519.49	$ 1,523.27	$ 1,549.52	$ 1,514.08	$ 1,517.88	$ 1,540.09	$ 1,552.9
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	362.1	362.1	362.1	362.1	362.1	332.9	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 156.2	$ 143.6	$ 143.6
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	148963	149161	149179	148981	150907	150889	149197	151123	148964	149162
Upgrade Package List	Pkg3321201053	Pkg3321202052	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321201052	Pkg3321202054	Pkg3321202053	Pkg3321201053	Pkg3321202052
GHGI [kg/m2]	3.49	3.49	3.49	3.48	3.48	3.49	3.48	3.48	3.25	3.26
% ICC	5.2%	5.1%	5.2%	5.3%	5.3%	5.2%	5.3%	5.3%	5.3%	5.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	25.7	26.7	25.3	24.8	25.1	26.5	24.3	24.7	25.8	26.7
Output: MEUI [kWh/(m2 * yr)]	33.2	33.6	32.9	32.5	32.7	33.4	32.4	32.5	31.9	32.3
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5220.0%	5020.0%	5310.0%	5400.0%	5330.0%	5070.0%	5480.0%	5420.0%	5220.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3693	3784	3628	3548	3575	3760	3510	3537	3694	3784
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 520.74	$ 533.49	$ 511.48	$ 500.31	$ 504.07	$ 530.23	$ 494.92	$ 498.7	$ 520.84	$ 533.6
Annual savings in carbon tax for electricity [$/year]	$ 1.85	$ 1.89	$ 1.81	$ 1.77	$ 1.79	$ 1.88	$ 1.76	$ 1.77	$ 1.85	$ 1.89
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 522.59	$ 535.38	$ 513.29	$ 502.08	$ 505.86	$ 532.11	$ 496.68	$ 500.47	$ 522.69	$ 535.49
Annual savings in GHG from electricity savings [kg CO2e/year]	40.6	41.6	39.9	39	39.3	41.4	38.6	38.9	40.6	41.6
Annual savings in natural gas [m3/year]	73.19	73.19	73.19	73.19	73.19	73.19	73.19	73.19	74.28	74.28
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 678.08	$ 688.16	$ 688.16
Annual savings in carbon tax for natural gas [$/year]	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 169.25	$ 171.76	$ 171.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 847.33	$ 859.93	$ 859.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	3761	3761	3761	3761	3761	3761	3761	3761	3816.9	3816.9
Net Present Value [$]	$ 20,127.4	$ 20,140.81	$ 20,178.94	$ 20,254.38	$ 20,278.5	$ 20,316.14	$ 20,376.58	$ 20,401.06	$ 20,434.64	$ 20,448.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01	$ 10,017.01
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

MEDIUM 25SAR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,230.25	$ 11,450.99	$ 11,685.58	$ 11,780.25	$ 11,830.25	$ 11,906.32	$ 11,991.5	$ 12,000.99	$ 12,050.99	$ 12,080.25
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 12,645.26	$ 12,893.81	$ 13,157.96	$ 13,264.56	$ 13,320.86	$ 13,406.52	$ 13,502.43	$ 13,513.11	$ 13,569.41	$ 13,602.36
Net Present Value [$]	$ 7,756.35	$ 7,849.89	$ 8,011.88	$ 7,988.97	$ 6,353.14	$ 8,111.02	$ 406.67	$ 8,082.51	$ 6,445.7	$ 8,082.96
Incremental dollars per GHG saving	$ 2.57	$ 2.62	$ 2.68	$ 2.66	$ 2.42	$ 2.73	$ 4.73	$ 2.7	$ 2.46	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	52.4	51.9	51.7	52.4	54	51.2	47.4	51.9	53.5	52.4
Annual Energy DHW [GJ/yr]	24.7	24.7	24.6	23.2	14.3	24.6	12.3	23.2	14.3	22.3
Annual Energy Space Heating [GJ/yr]	21.3	21.1	21	21.3	21.8	20.9	50.2	21.1	21.6	21.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	74.9	74.7	74.6	73.5	65	74.4	88.9	73.3	64.8	72.6
Design Heating Load [W]	11708.7	11618.8	11618.8	11708.7	11421.6	11528.8	10510	11618.8	11331.7	11708.7
Annual Energy Electricity [kWh/yr]	13954.2	13904.4	13877.8	13954.2	14084.5	13830.3	7577.3	13904.4	14034.7	13954.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,911.2	$ 1,904.16	$ 1,900.39	$ 1,911.2	$ 1,929.64	$ 1,893.67	$ 1,008.87	$ 1,904.16	$ 1,922.6	$ 1,911.2
Annual Energy Natural Gas [m3/yr]	661.9	662	661.5	624	382.7	661.6	1653.5	624.1	382.7	599.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.52	$ 285.56	$ 285.35	$ 269.17	$ 165.08	$ 285.39	$ 713.26	$ 269.21	$ 165.08	$ 258.56
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116866	117136	118486	116867	116869	118756	126366	117137	117139	116868
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121101031	Pkg2133102031	Pkg2231101031	Pkg2121102031	Pkg2121102031	Pkg2121101031
GHGI [kg/m2]	6.06	6.06	6.05	5.75	3.79	6.05	13.86	5.75	3.78	5.55
% ICC	2.1%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	62.1	61.5	61.2	62.1	64	60.6	56.2	61.5	63.4	62.1
Output: MEUI [kWh/(m2 * yr)]	57.9	57.7	57.6	56.3	46.2	57.4	74.9	56.1	46	55.2
Output: Better than ERS (%)	19260.0%	19180.0%	19140.0%	18710.0%	15390.0%	19060.0%	24730.0%	18630.0%	15310.0%	18360.0%
Output: Better than Envelope (%)	1270.0%	1350.0%	1380.0%	1270.0%	1000.0%	1470.0%	2100.0%	1350.0%	1080.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6183	6134	6107	6183	6314	6060	194	6134	6264	6183
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 871.86	$ 864.84	$ 861.09	$ 871.86	$ 890.23	$ 854.39	$ 27.28	$ 864.84	$ 883.21	$ 871.86
Annual savings in carbon tax for electricity [$/year]	$ 3.09	$ 3.07	$ 3.05	$ 3.09	$ 3.16	$ 3.03	$ .1	$ 3.07	$ 3.13	$ 3.09
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 874.95	$ 867.9	$ 864.14	$ 874.95	$ 893.39	$ 857.42	$ 27.38	$ 867.9	$ 886.34	$ 874.95
Annual savings in GHG from electricity savings [kg CO2e/year]	68	67.5	67.2	68	69.5	66.7	2.1	67.5	68.9	68
Annual savings in natural gas [m3/year]	86.26	86.26	86.28	87.67	96.66	86.27	49.32	87.67	96.66	88.59
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 799.22	$ 799.18	$ 799.35	$ 812.3	$ 895.6	$ 799.32	$ 456.91	$ 812.26	$ 895.6	$ 820.79
Annual savings in carbon tax for natural gas [$/year]	$ 199.48	$ 199.47	$ 199.51	$ 202.75	$ 223.54	$ 199.51	$ 114.04	$ 202.74	$ 223.54	$ 204.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 998.7	$ 998.65	$ 998.87	$ 1,015.05	$ 1,119.13	$ 998.83	$ 570.95	$ 1,015.	$ 1,119.13	$ 1,025.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	4432.9	4432.7	4433.7	4505.5	4967.5	4433.5	2534.3	4505.3	4967.5	4552.6
Net Present Value [$]	$ 7,756.35	$ 7,849.89	$ 8,011.88	$ 7,988.97	$ 6,353.14	$ 8,111.02	$ 406.67	$ 8,082.51	$ 6,445.7	$ 8,082.96
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$ 850.

MEDIUM 25SAR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,830.25	$ 12,050.99	$ 12,380.25	$ 12,285.58	$ 12,680.25	$ 12,600.99	$ 12,506.32	$ 11,230.25	$ 12,900.99	$ 12,835.58
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,320.86	$ 13,569.41	$ 13,940.16	$ 13,833.56	$ 14,277.96	$ 14,188.71	$ 14,082.12	$ 12,645.26	$ 14,526.51	$ 14,452.86
Net Present Value [$]	$ 6,353.14	$ 6,445.7	$ 6,635.14	$ 6,598.13	$ 6,760.87	$ 6,727.71	$ 6,706.95	$ 7,756.35	$ 6,853.43	$ 6,880.14
Incremental dollars per GHG saving	$ 2.42	$ 2.46	$ 2.5	$ 2.51	$ 2.54	$ 2.54	$ 2.55	$ 2.57	$ 2.58	$ 2.59
Auxiliary Energy Required Heating [GJ/yr]	54	53.5	54	53.2	54	53.5	52.7	52.4	53.5	53.2
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	14.3	24.7	12.3	13
Annual Energy Space Heating [GJ/yr]	21.8	21.6	21.8	21.5	21.8	21.6	21.3	21.3	21.6	21.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	65	64.8	63.8	64.7	63	63.6	64.5	74.9	62.8	63.5
Design Heating Load [W]	11421.6	11331.7	11421.6	11331.7	11421.6	11331.7	11241.7	11708.7	11331.7	11331.7
Annual Energy Electricity [kWh/yr]	14084.5	14034.7	14085.5	14002.8	14086.1	14035.7	13959.3	13954.2	14036.3	14003.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,929.64	$ 1,922.6	$ 1,929.78	$ 1,918.08	$ 1,929.87	$ 1,922.74	$ 1,911.93	$ 1,911.2	$ 1,922.82	$ 1,918.22
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	382.7	329.4	350.4	382.7	661.9	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 151.15	$ 165.08	$ 285.52	$ 142.09	$ 151.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116869	117139	116870	118489	116871	117140	118759	116866	117141	118490
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121101031	Pkg2121102031	Pkg2131101031
GHGI [kg/m2]	3.79	3.78	3.52	3.78	3.35	3.52	3.78	6.06	3.35	3.52
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.1%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64	63.4	64	63.1	64	63.4	62.5	62.1	63.4	63.1
Output: MEUI [kWh/(m2 * yr)]	46.2	46	44.7	45.8	43.8	44.5	45.6	57.9	43.6	44.4
Output: Better than ERS (%)	15390.0%	15310.0%	14920.0%	15270.0%	14610.0%	14840.0%	15200.0%	19260.0%	14530.0%	14800.0%
Output: Better than Envelope (%)	1000.0%	1080.0%	1000.0%	1130.0%	1000.0%	1080.0%	1220.0%	1270.0%	1080.0%	1130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6314	6264	6315	6232	6315	6265	6188	6183	6266	6233
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 890.23	$ 883.21	$ 890.37	$ 878.71	$ 890.46	$ 883.35	$ 872.58	$ 871.86	$ 883.44	$ 878.85
Annual savings in carbon tax for electricity [$/year]	$ 3.16	$ 3.13	$ 3.16	$ 3.12	$ 3.16	$ 3.13	$ 3.09	$ 3.09	$ 3.13	$ 3.12
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 893.39	$ 886.34	$ 893.53	$ 881.83	$ 893.61	$ 886.48	$ 875.67	$ 874.95	$ 886.57	$ 881.97
Annual savings in GHG from electricity savings [kg CO2e/year]	69.5	68.9	69.5	68.6	69.5	68.9	68.1	68	68.9	68.6
Annual savings in natural gas [m3/year]	96.66	96.66	97.87	96.66	98.65	97.87	96.66	86.26	98.65	97.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 895.6	$ 906.75	$ 895.6	$ 914.	$ 906.75	$ 895.6	$ 799.22	$ 914.	$ 906.75
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 223.54	$ 226.32	$ 223.54	$ 228.13	$ 226.32	$ 223.54	$ 199.48	$ 228.13	$ 226.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,119.13	$ 1,133.07	$ 1,119.13	$ 1,142.13	$ 1,133.07	$ 1,119.13	$ 998.7	$ 1,142.13	$ 1,133.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	4967.5	5029.3	4967.5	5069.5	5029.3	4967.5	4432.9	5069.5	5029.3
Net Present Value [$]	$ 6,353.14	$ 6,445.7	$ 6,635.14	$ 6,598.13	$ 6,760.87	$ 6,727.71	$ 6,706.95	$ 7,756.35	$ 6,853.43	$ 6,880.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.

MEDIUM 25SAR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,991.5	$ 12,212.24	$ 12,486.17	$ 12,706.91	$ 12,941.5	$ 13,036.17	$ 13,162.24	$ 13,256.91	$ 12,896.17	$ 13,336.17
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,502.43	$ 13,750.98	$ 14,059.43	$ 14,307.98	$ 14,572.13	$ 14,678.73	$ 14,820.68	$ 14,927.28	$ 14,521.09	$ 15,016.53
Net Present Value [$]	$ 406.67	$ 505.88	$ 1,363.7	$ 1,463.28	$ 1,641.14	$ 1,645.21	$ 1,741.32	$ 1,744.43	$ 1,760.01	$ 1,770.99
Incremental dollars per GHG saving	$ 4.73	$ 4.77	$ 4.85	$ 4.88	$ 4.95	$ 4.94	$ 4.99	$ 4.98	$ 4.99	$ 4.98
Auxiliary Energy Required Heating [GJ/yr]	47.4	46.9	44.7	44.2	44	44.7	43.5	44.2	46.5	44.7
Annual Energy DHW [GJ/yr]	12.3	12.3	14.3	14.3	14.3	13	14.3	13	12.3	12.3
Annual Energy Space Heating [GJ/yr]	50.2	49.7	47.4	46.8	46.6	47.4	46.1	46.9	49.2	47.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	88.9	88.3	88.9	88.4	88.2	87.7	87.7	87.2	88.8	87
Design Heating Load [W]	10510	10420.1	9729.3	9639.4	9639.4	9729.3	9549.5	9639.4	9905.9	9729.3
Annual Energy Electricity [kWh/yr]	7577.3	7574.7	7827.9	7825.4	7824.2	7828	7821.6	7825.4	7837.2	7828
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,008.87	$ 1,008.51	$ 1,044.33	$ 1,043.98	$ 1,043.81	$ 1,044.35	$ 1,043.44	$ 1,043.98	$ 1,045.65	$ 1,044.35
Annual Energy Natural Gas [m3/yr]	1653.5	1639.8	1631.7	1618	1611.6	1599.6	1598	1585.9	1627.2	1578.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 713.26	$ 707.35	$ 703.86	$ 697.95	$ 695.19	$ 690.01	$ 689.32	$ 684.1	$ 701.92	$ 681.04
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	126366	126636	123268	123538	126400	123269	126670	123539	123252	123270
Upgrade Package List	Pkg2231101031	Pkg2231102031	Pkg2221101033	Pkg2221102033	Pkg2231101033	Pkg2221101033	Pkg2231102033	Pkg2221102033	Pkg2221101032	Pkg2221101033
GHGI [kg/m2]	13.86	13.75	13.7	13.58	13.53	13.43	13.42	13.32	13.66	13.26
% ICC	2.3%	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.2	55.6	53	52.4	52.1	53	51.6	52.4	55.1	53
Output: MEUI [kWh/(m2 * yr)]	74.9	74.3	75	74.4	74.1	73.6	73.5	73	74.9	72.7
Output: Better than ERS (%)	24730.0%	24490.0%	24730.0%	24530.0%	24450.0%	24260.0%	24260.0%	24060.0%	24690.0%	23980.0%
Output: Better than Envelope (%)	2100.0%	2180.0%	2550.0%	2630.0%	2670.0%	2550.0%	2750.0%	2630.0%	2250.0%	2550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	194	196	57	55	53	57	51	55	66	57
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 27.28	$ 27.65	$ 8.05	$ 7.7	$ 7.53	$ 8.07	$ 7.16	$ 7.7	$ 9.36	$ 8.07
Annual savings in carbon tax for electricity [$/year]	$ .1	$ .1	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 27.38	$ 27.75	$ 8.08	$ 7.73	$ 7.56	$ 8.09	$ 7.19	$ 7.73	$ 9.4	$ 8.09
Annual savings in GHG from electricity savings [kg CO2e/year]	2.1	2.2	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6
Annual savings in natural gas [m3/year]	49.32	49.83	50.13	50.64	50.88	51.32	51.38	51.83	50.3	52.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 456.91	$ 461.64	$ 464.44	$ 469.17	$ 471.38	$ 475.52	$ 476.07	$ 480.25	$ 465.99	$ 482.7
Annual savings in carbon tax for natural gas [$/year]	$ 114.04	$ 115.22	$ 115.92	$ 117.1	$ 117.65	$ 118.69	$ 118.82	$ 119.87	$ 116.31	$ 120.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 570.95	$ 576.86	$ 580.36	$ 586.27	$ 589.03	$ 594.21	$ 594.9	$ 600.12	$ 582.3	$ 603.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	2534.3	2560.5	2576	2602.3	2614.5	2637.5	2640.6	2663.7	2584.6	2677.3
Net Present Value [$]	$ 406.67	$ 505.88	$ 1,363.7	$ 1,463.28	$ 1,641.14	$ 1,645.21	$ 1,741.32	$ 1,744.43	$ 1,760.01	$ 1,770.99
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.

MEDIUM 25SAR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,236.17	$ 13,456.91	$ 13,691.5	$ 13,706.32	$ 13,786.17	$ 13,836.17	$ 13,912.24	$ 14,006.91	$ 14,056.91	$ 14,086.17
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 14,903.93	$ 15,152.48	$ 15,416.63	$ 15,433.32	$ 15,523.23	$ 15,579.53	$ 15,665.18	$ 15,771.78	$ 15,828.08	$ 15,861.03
Net Present Value [$]	$ 8,129.53	$ 8,206.63	$ 8,371.12	$ 9,711.69	$ 8,362.14	$ 6,707.58	$ 8,464.96	$ 8,439.	$ 6,799.78	$ 8,456.14
Incremental dollars per GHG saving	$ 3.03	$ 3.08	$ 3.13	$ 3.14	$ 3.1	$ 2.82	$ 3.18	$ 3.15	$ 2.87	$ 3.14
Auxiliary Energy Required Heating [GJ/yr]	46.4	45.9	45.7	47.8	46.4	48	45.2	45.9	47.5	46.4
Annual Energy DHW [GJ/yr]	24.7	24.7	24.6	24.7	23.3	14.3	24.6	23.3	14.3	22.3
Annual Energy Space Heating [GJ/yr]	19	18.9	18.8	19.6	19	19.5	18.6	18.9	19.3	19
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	1.7	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	72.6	72.4	72.3	74.2	71.2	62.6	72.1	71	62.5	70.3
Design Heating Load [W]	10964.5	10874.6	10874.6	10658.3	10964.5	10677.4	10784.7	10874.6	10587.5	10964.5
Annual Energy Electricity [kWh/yr]	13318.7	13262.5	13237	13751.9	13318.7	13443	13187.7	13262.5	13393.1	13318.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,821.28	$ 1,813.33	$ 1,809.72	$ 1,882.58	$ 1,821.28	$ 1,838.87	$ 1,802.74	$ 1,813.33	$ 1,831.81	$ 1,821.28
Annual Energy Natural Gas [m3/yr]	662.3	662.4	661.9	661.9	624.4	382.7	661.9	624.5	382.7	599.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.69	$ 285.74	$ 285.52	$ 285.52	$ 269.34	$ 165.08	$ 285.52	$ 269.39	$ 165.08	$ 258.73
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123238	123508	126370	118792	123239	123241	126640	123509	123511	123240
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2131102033	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221102031	Pkg2221101031
GHGI [kg/m2]	6.04	6.03	6.03	6.05	5.73	3.76	6.03	5.72	3.75	5.52
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55	54.4	54.2	56.6	55	56.8	53.6	54.4	56.2	55
Output: MEUI [kWh/(m2 * yr)]	55.2	55	54.9	57.1	53.6	43.4	54.7	53.3	43.2	52.5
Output: Better than ERS (%)	18360.0%	18280.0%	18240.0%	18980.0%	17810.0%	14450.0%	18160.0%	17730.0%	14410.0%	17460.0%
Output: Better than Envelope (%)	2270.0%	2350.0%	2380.0%	2030.0%	2270.0%	2000.0%	2470.0%	2350.0%	2080.0%	2270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5548	5492	5466	5981	5548	5672	5417	5492	5622	5548
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 782.25	$ 774.33	$ 770.73	$ 843.34	$ 782.25	$ 799.78	$ 763.78	$ 774.33	$ 792.74	$ 782.25
Annual savings in carbon tax for electricity [$/year]	$ 2.77	$ 2.75	$ 2.73	$ 2.99	$ 2.77	$ 2.84	$ 2.71	$ 2.75	$ 2.81	$ 2.77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 785.03	$ 777.08	$ 773.47	$ 846.33	$ 785.03	$ 802.62	$ 766.49	$ 777.08	$ 795.56	$ 785.03
Annual savings in GHG from electricity savings [kg CO2e/year]	61	60.4	60.1	65.8	61	62.4	59.6	60.4	61.8	61
Annual savings in natural gas [m3/year]	86.25	86.24	86.26	86.26	87.66	96.66	86.26	87.66	96.66	88.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 799.08	$ 799.04	$ 799.22	$ 799.22	$ 812.16	$ 895.6	$ 799.22	$ 812.13	$ 895.6	$ 820.65
Annual savings in carbon tax for natural gas [$/year]	$ 199.45	$ 199.44	$ 199.48	$ 199.48	$ 202.71	$ 223.54	$ 199.48	$ 202.7	$ 223.54	$ 204.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 998.52	$ 998.48	$ 998.7	$ 998.7	$ 1,014.87	$ 1,119.13	$ 998.7	$ 1,014.83	$ 1,119.13	$ 1,025.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	4432.1	4431.9	4432.9	4432.9	4504.7	4967.5	4432.9	4504.5	4967.5	4551.8
Net Present Value [$]	$ 8,129.53	$ 8,206.63	$ 8,371.12	$ 9,711.69	$ 8,362.14	$ 6,707.58	$ 8,464.96	$ 8,439.	$ 6,799.78	$ 8,456.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.

MEDIUM 25SAR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,836.17	$ 14,056.91	$ 14,386.17	$ 14,291.5	$ 14,686.17	$ 14,606.91	$ 14,512.24	$ 14,906.91	$ 14,841.5	$ 16,865.5
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 15,579.53	$ 15,828.08	$ 16,198.83	$ 16,092.23	$ 16,536.63	$ 16,447.38	$ 16,340.78	$ 16,785.18	$ 16,711.53	$ 18,990.55
Net Present Value [$]	$ 6,707.58	$ 6,799.78	$ 6,989.58	$ 6,969.55	$ 7,115.31	$ 7,081.97	$ 7,069.05	$ 7,207.51	$ 7,251.56	$ 13,109.3
Incremental dollars per GHG saving	$ 2.82	$ 2.87	$ 2.9	$ 2.91	$ 2.93	$ 2.94	$ 2.96	$ 2.98	$ 2.99	$ 3.01
Auxiliary Energy Required Heating [GJ/yr]	48	47.5	48	47.2	48	47.5	46.7	47.5	47.2	47.9
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	14.3	12.3	13	8.3
Annual Energy Space Heating [GJ/yr]	19.5	19.3	19.5	19.2	19.5	19.3	19.1	19.3	19.2	19.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7
Total Energy [GJ/yr]	62.6	62.5	61.4	62.4	60.7	61.3	62.2	60.5	61.2	57.6
Design Heating Load [W]	10677.4	10587.5	10677.4	10587.5	10677.4	10587.5	10497.6	10587.5	10587.5	10004
Annual Energy Electricity [kWh/yr]	13443	13393.1	13444	13367.9	13444.6	13394.1	13320.8	13394.7	13368.9	15998.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,838.87	$ 1,831.81	$ 1,839.01	$ 1,828.24	$ 1,839.1	$ 1,831.95	$ 1,821.58	$ 1,832.04	$ 1,828.38	$ 2,200.42
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	382.7	329.4	350.4	382.7	329.4	350.4	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 151.15	$ 165.08	$ 142.09	$ 151.15	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123241	123511	123242	126373	123243	123512	126643	123513	126374	126412
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2231102031	Pkg2221102031	Pkg2231101031	Pkg2231101033
GHGI [kg/m2]	3.76	3.75	3.49	3.75	3.32	3.49	3.75	3.32	3.49	0.75
% ICC	2.6%	2.7%	2.8%	2.7%	2.8%	2.8%	2.8%	2.9%	2.8%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.8	56.2	56.8	56	56.8	56.3	55.4	56.3	56	56.7
Output: MEUI [kWh/(m2 * yr)]	43.4	43.2	42	43.1	41.1	41.8	42.9	40.9	41.7	37.4
Output: Better than ERS (%)	14450.0%	14410.0%	13980.0%	14370.0%	13710.0%	13950.0%	14300.0%	13630.0%	13910.0%	12500.0%
Output: Better than Envelope (%)	2000.0%	2080.0%	2000.0%	2130.0%	2000.0%	2080.0%	2220.0%	2080.0%	2130.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5672	5622	5673	5597	5674	5623	5550	5624	5598	8227
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 799.78	$ 792.74	$ 799.92	$ 789.19	$ 800.01	$ 792.89	$ 782.55	$ 792.97	$ 789.33	$ 1,160.05
Annual savings in carbon tax for electricity [$/year]	$ 2.84	$ 2.81	$ 2.84	$ 2.8	$ 2.84	$ 2.81	$ 2.78	$ 2.81	$ 2.8	$ 4.11
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 802.62	$ 795.56	$ 802.76	$ 791.99	$ 802.84	$ 795.7	$ 785.32	$ 795.78	$ 792.13	$ 1,164.16
Annual savings in GHG from electricity savings [kg CO2e/year]	62.4	61.8	62.4	61.6	62.4	61.9	61	61.9	61.6	90.5
Annual savings in natural gas [m3/year]	96.66	96.66	97.87	96.66	98.65	97.87	96.66	98.65	97.87	110.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 895.6	$ 906.75	$ 895.6	$ 914.	$ 906.75	$ 895.6	$ 914.	$ 906.75	$ 1,027.71
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 223.54	$ 226.32	$ 223.54	$ 228.13	$ 226.32	$ 223.54	$ 228.13	$ 226.32	$ 256.51
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,119.13	$ 1,133.07	$ 1,119.13	$ 1,142.13	$ 1,133.07	$ 1,119.13	$ 1,142.13	$ 1,133.07	$ 1,284.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	4967.5	5029.3	4967.5	5069.5	5029.3	4967.5	5069.5	5029.3	5700.2
Net Present Value [$]	$ 6,707.58	$ 6,799.78	$ 6,989.58	$ 6,969.55	$ 7,115.31	$ 7,081.97	$ 7,069.05	$ 7,207.51	$ 7,251.56	$ 13,109.3
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.

MEDIUM 25SAR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,836.17	$ 14,056.91	$ 14,291.5	$ 14,386.17	$ 14,512.24	$ 14,606.91	$ 14,686.17	$ 14,906.91	$ 14,841.5	$ 15,062.24
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 15,579.53	$ 15,828.08	$ 16,092.23	$ 16,198.83	$ 16,340.78	$ 16,447.38	$ 16,536.63	$ 16,785.18	$ 16,711.53	$ 16,960.08
Net Present Value [$]	$ 6,707.58	$ 6,799.78	$ 6,969.55	$ 6,989.58	$ 7,069.05	$ 7,081.97	$ 7,115.31	$ 7,207.51	$ 7,251.56	$ 7,351.06
Incremental dollars per GHG saving	$ 2.82	$ 2.87	$ 2.91	$ 2.9	$ 2.96	$ 2.94	$ 2.93	$ 2.98	$ 2.99	$ 3.03
Auxiliary Energy Required Heating [GJ/yr]	48	47.5	47.2	48	46.7	47.5	48	47.5	47.2	46.8
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	13	12.3	12.3	13	13
Annual Energy Space Heating [GJ/yr]	19.5	19.3	19.2	19.5	19.1	19.3	19.5	19.3	19.2	19.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	62.6	62.5	62.4	61.4	62.2	61.3	60.7	60.5	61.2	61
Design Heating Load [W]	10677.4	10587.5	10587.5	10677.4	10497.6	10587.5	10677.4	10587.5	10587.5	10497.6
Annual Energy Electricity [kWh/yr]	13443	13393.1	13367.9	13444	13320.8	13394.1	13444.6	13394.7	13368.9	13321.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,838.87	$ 1,831.81	$ 1,828.24	$ 1,839.01	$ 1,821.58	$ 1,831.95	$ 1,839.1	$ 1,832.04	$ 1,828.38	$ 1,821.72
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	382.7	350.4	329.4	329.4	350.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 151.15	$ 142.09	$ 142.09	$ 151.15	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123241	123511	126373	123242	126643	123512	123243	123513	126374	126644
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2231102031
GHGI [kg/m2]	3.76	3.75	3.75	3.49	3.75	3.49	3.32	3.32	3.49	3.49
% ICC	2.6%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.9%	2.8%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.8	56.2	56	56.8	55.4	56.3	56.8	56.3	56	55.4
Output: MEUI [kWh/(m2 * yr)]	43.4	43.2	43.1	42	42.9	41.8	41.1	40.9	41.7	41.5
Output: Better than ERS (%)	14450.0%	14410.0%	14370.0%	13980.0%	14300.0%	13950.0%	13710.0%	13630.0%	13910.0%	13830.0%
Output: Better than Envelope (%)	2000.0%	2080.0%	2130.0%	2000.0%	2220.0%	2080.0%	2000.0%	2080.0%	2130.0%	2200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5672	5622	5597	5673	5550	5623	5674	5624	5598	5551
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 799.78	$ 792.74	$ 789.19	$ 799.92	$ 782.55	$ 792.89	$ 800.01	$ 792.97	$ 789.33	$ 782.69
Annual savings in carbon tax for electricity [$/year]	$ 2.84	$ 2.81	$ 2.8	$ 2.84	$ 2.78	$ 2.81	$ 2.84	$ 2.81	$ 2.8	$ 2.78
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 802.62	$ 795.56	$ 791.99	$ 802.76	$ 785.32	$ 795.7	$ 802.84	$ 795.78	$ 792.13	$ 785.47
Annual savings in GHG from electricity savings [kg CO2e/year]	62.4	61.8	61.6	62.4	61	61.9	62.4	61.9	61.6	61.1
Annual savings in natural gas [m3/year]	96.66	96.66	96.66	97.87	96.66	97.87	98.65	98.65	97.87	97.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 895.6	$ 895.6	$ 906.75	$ 895.6	$ 906.75	$ 914.	$ 914.	$ 906.75	$ 906.75
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 223.54	$ 223.54	$ 226.32	$ 223.54	$ 226.32	$ 228.13	$ 228.13	$ 226.32	$ 226.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,133.07	$ 1,119.13	$ 1,133.07	$ 1,142.13	$ 1,142.13	$ 1,133.07	$ 1,133.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	4967.5	4967.5	5029.3	4967.5	5029.3	5069.5	5069.5	5029.3	5029.3
Net Present Value [$]	$ 6,707.58	$ 6,799.78	$ 6,969.55	$ 6,989.58	$ 7,069.05	$ 7,081.97	$ 7,115.31	$ 7,207.51	$ 7,251.56	$ 7,351.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

MEDIUM 25SAR Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,790.5	$ 28,025.09	$ 28,245.83	$ 28,251.38	$ 28,340.5	$ 28,382.58	$ 28,427.25	$ 28,485.97	$ 28,547.66	$ 28,575.09
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,292.1	$ 31,556.25	$ 31,804.8	$ 31,811.05	$ 31,911.4	$ 31,958.79	$ 32,009.08	$ 32,075.2	$ 32,144.67	$ 32,175.55
Net Present Value [$]	$ 16,456.79	$ 16,634.23	$ 16,729.35	$ 16,917.67	$ 16,738.25	$ 16,992.27	$ 16,956.79	$ 17,095.11	$ 17,213.95	$ 16,916.06
Incremental dollars per GHG saving	$ 5.65	$ 5.69	$ 5.74	$ 5.74	$ 5.69	$ 5.77	$ 5.77	$ 5.79	$ 5.8	$ 5.73
Auxiliary Energy Required Heating [GJ/yr]	29.9	29.7	29.2	29.9	29.9	29.6	29.2	29.7	29.9	29.7
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	14.3	14.3	14.3	14.3	13
Annual Energy Space Heating [GJ/yr]	12.5	12.4	12.3	12.5	12.5	12.5	12.3	12.4	12.5	12.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	56.8	56.7	56.5	56.8	55.6	56.7	56.6	56.7	56.8	55.5
Design Heating Load [W]	7817	7817	7727.1	7817	7817	7712	7764.1	7817	7817	7817
Annual Energy Electricity [kWh/yr]	11809.6	11787.4	11738.6	11809.6	11810.4	11787.6	11756.5	11787.4	11809.6	11788.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,607.74	$ 1,604.6	$ 1,597.7	$ 1,607.74	$ 1,607.86	$ 1,604.63	$ 1,600.23	$ 1,604.6	$ 1,607.74	$ 1,604.73
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	350.4	382.7	382.7	382.7	382.7	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	149197	150925	151141	149845	149198	151339	149413	151573	150493	150926
Upgrade Package List	Pkg3321202054	Pkg3331201054	Pkg3331202054	Pkg3321302054	Pkg3321202054	Pkg3331203053	Pkg3321203054	Pkg3331301054	Pkg3321402054	Pkg3331201054
GHGI [kg/m2]	3.68	3.68	3.68	3.68	3.42	3.68	3.68	3.68	3.68	3.42
% ICC	5.3%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.5%	5.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	35.4	35.2	34.6	35.4	35.4	35.1	34.6	35.2	35.4	35.2
Output: MEUI [kWh/(m2 * yr)]	36.5	36.4	36.2	36.5	35	36.4	36.2	36.4	36.5	34.9
Output: Better than ERS (%)	12190.0%	12150.0%	12070.0%	12190.0%	11720.0%	12150.0%	12110.0%	12150.0%	12190.0%	11680.0%
Output: Better than Envelope (%)	5020.0%	5050.0%	5130.0%	5020.0%	5020.0%	5070.0%	5130.0%	5050.0%	5020.0%	5050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4039	4017	3968	4039	4040	4017	3986	4017	4039	4018
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 569.47	$ 566.34	$ 559.46	$ 569.47	$ 569.58	$ 566.37	$ 561.98	$ 566.34	$ 569.47	$ 566.47
Annual savings in carbon tax for electricity [$/year]	$ 2.02	$ 2.01	$ 1.98	$ 2.02	$ 2.02	$ 2.01	$ 1.99	$ 2.01	$ 2.02	$ 2.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 571.49	$ 568.35	$ 561.44	$ 571.49	$ 571.6	$ 568.38	$ 563.98	$ 568.35	$ 571.49	$ 568.48
Annual savings in GHG from electricity savings [kg CO2e/year]	44.4	44.2	43.6	44.4	44.4	44.2	43.8	44.2	44.4	44.2
Annual savings in natural gas [m3/year]	96.66	96.66	96.66	96.66	97.87	96.66	96.66	96.66	96.66	97.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 895.6	$ 895.6	$ 895.6	$ 906.75	$ 895.6	$ 895.6	$ 895.6	$ 895.6	$ 906.75
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 223.54	$ 223.54	$ 223.54	$ 226.32	$ 223.54	$ 223.54	$ 223.54	$ 223.54	$ 226.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,133.07	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,133.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	4967.5	4967.5	4967.5	5029.3	4967.5	4967.5	4967.5	4967.5	5029.3
Net Present Value [$]	$ 16,456.79	$ 16,634.23	$ 16,729.35	$ 16,917.67	$ 16,738.25	$ 16,992.27	$ 16,956.79	$ 17,095.11	$ 17,213.95	$ 16,916.06
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	10.51	14.09	14.09	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 1,163.13	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 2,213.87	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$ 550.

MEDIUM 25SAR Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,790.5	$ 28,340.5	$ 28,025.09	$ 28,640.5	$ 32,190.83	$ 28,575.09	$ 28,245.83	$ 28,251.38	$ 28,875.09	$ 28,382.58
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,292.1	$ 31,911.4	$ 31,556.25	$ 32,249.2	$ 36,246.87	$ 32,175.55	$ 31,804.8	$ 31,811.05	$ 32,513.35	$ 31,958.79
Net Present Value [$]	$ 16,456.79	$ 16,738.25	$ 16,634.23	$ 16,863.98	$ 23,570.2	$ 16,916.06	$ 16,729.35	$ 16,917.67	$ 17,041.6	$ 16,992.27
Incremental dollars per GHG saving	$ 5.65	$ 5.69	$ 5.69	$ 5.7	$ 5.72	$ 5.73	$ 5.74	$ 5.74	$ 5.75	$ 5.77
Auxiliary Energy Required Heating [GJ/yr]	29.9	29.9	29.7	29.9	30	29.7	29.2	29.9	29.7	29.6
Annual Energy DHW [GJ/yr]	14.3	13	14.3	12.3	8.3	13	14.3	14.3	12.3	14.3
Annual Energy Space Heating [GJ/yr]	12.5	12.5	12.4	12.5	12.6	12.5	12.3	12.5	12.5	12.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	56.8	55.6	56.7	54.8	50.8	55.5	56.8	56.8	54.7	56.7
Design Heating Load [W]	7817	7817	7817	7817	7498.8	7817	7727.1	7817	7817	7712
Annual Energy Electricity [kWh/yr]	11809.6	11810.4	11787.4	11811	14108.6	11788.3	11738.6	11809.6	11788.9	11787.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,607.74	$ 1,607.86	$ 1,604.6	$ 1,607.94	$ 1,933.05	$ 1,604.73	$ 1,597.7	$ 1,607.74	$ 1,604.81	$ 1,604.63
Annual Energy Natural Gas [m3/yr]	382.7	350.4	382.7	329.4	0	350.4	382.7	382.7	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$.	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	149197	149198	150925	149199	157786	150926	151141	149845	150927	151339
Upgrade Package List	Pkg3321202054	Pkg3321202054	Pkg3331201054	Pkg3321202054	Pkg4341303054	Pkg3331201054	Pkg3321202054	Pkg3321302054	Pkg3331201054	Pkg3331203053
GHGI [kg/m2]	3.68	3.42	3.68	3.24	0.66	3.42	3.68	3.68	3.24	3.68
% ICC	5.3%	5.4%	5.4%	5.5%	6.2%	5.5%	5.4%	5.4%	5.5%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	35.4	35.4	35.2	35.4	35.6	35.2	34.6	35.4	35.2	35.1
Output: MEUI [kWh/(m2 * yr)]	36.5	35	36.4	34.1	29.4	34.9	36.2	36.5	34	36.4
Output: Better than ERS (%)	12190.0%	11720.0%	12150.0%	11410.0%	9840.0%	11680.0%	12070.0%	12190.0%	11370.0%	12150.0%
Output: Better than Envelope (%)	5020.0%	5020.0%	5050.0%	5020.0%	5000.0%	5050.0%	5130.0%	5020.0%	5050.0%	5070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4039	4040	4017	4040	6338	4018	3968	4039	4018	4017
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 569.47	$ 569.58	$ 566.34	$ 569.67	$ 893.63	$ 566.47	$ 559.46	$ 569.47	$ 566.55	$ 566.37
Annual savings in carbon tax for electricity [$/year]	$ 2.02	$ 2.02	$ 2.01	$ 2.02	$ 3.17	$ 2.01	$ 1.98	$ 2.02	$ 2.01	$ 2.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 571.49	$ 571.6	$ 568.35	$ 571.69	$ 896.8	$ 568.48	$ 561.44	$ 571.49	$ 568.56	$ 568.38
Annual savings in GHG from electricity savings [kg CO2e/year]	44.4	44.4	44.2	44.4	69.7	44.2	43.6	44.4	44.2	44.2
Annual savings in natural gas [m3/year]	96.66	97.87	96.66	98.65	110.92	97.87	96.66	96.66	98.65	96.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 906.75	$ 895.6	$ 914.	$ 1,027.71	$ 906.75	$ 895.6	$ 895.6	$ 914.	$ 895.6
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 226.32	$ 223.54	$ 228.13	$ 256.51	$ 226.32	$ 223.54	$ 223.54	$ 228.13	$ 223.54
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,133.07	$ 1,119.13	$ 1,142.13	$ 1,284.22	$ 1,133.07	$ 1,119.13	$ 1,119.13	$ 1,142.13	$ 1,119.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	5029.3	4967.5	5069.5	5700.2	5029.3	4967.5	4967.5	5069.5	4967.5
Net Present Value [$]	$ 16,456.79	$ 16,738.25	$ 16,634.23	$ 16,863.98	$ 23,570.2	$ 16,916.06	$ 16,729.35	$ 16,917.67	$ 17,041.6	$ 16,992.27
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	14.09	8.78	10.51	10.51	8.78	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 1,860.13	$ 786.76	$ 786.76	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.	$.	$ 850.	$.

MEDIUM 25SAR Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k	Medium 25SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,790.5	$ 28,025.09	$ 28,245.83	$ 28,340.5	$ 28,640.5	$ 28,575.09	$ 28,251.38	$ 28,427.25	$ 28,382.58	$ 28,795.83
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,292.1	$ 31,556.25	$ 31,804.8	$ 31,911.4	$ 32,249.2	$ 32,175.55	$ 31,811.05	$ 32,009.08	$ 31,958.79	$ 32,424.1
Net Present Value [$]	$ 16,456.79	$ 16,634.23	$ 16,729.35	$ 16,738.25	$ 16,863.98	$ 16,916.06	$ 16,917.67	$ 16,956.79	$ 16,992.27	$ 17,011.18
Incremental dollars per GHG saving	$ 5.65	$ 5.69	$ 5.74	$ 5.69	$ 5.7	$ 5.73	$ 5.74	$ 5.77	$ 5.77	$ 5.78
Auxiliary Energy Required Heating [GJ/yr]	29.9	29.7	29.2	29.9	29.9	29.7	29.9	29.2	29.6	29.2
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	12.3	13	14.3	14.3	14.3	13
Annual Energy Space Heating [GJ/yr]	12.5	12.4	12.3	12.5	12.5	12.5	12.5	12.3	12.5	12.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	56.8	56.7	56.5	55.6	54.8	55.5	56.8	56.6	56.7	55.3
Design Heating Load [W]	7817	7817	7727.1	7817	7817	7817	7817	7764.1	7712	7727.1
Annual Energy Electricity [kWh/yr]	11809.6	11787.4	11738.6	11810.4	11811	11788.3	11809.6	11756.5	11787.6	11739.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,607.74	$ 1,604.6	$ 1,597.7	$ 1,607.86	$ 1,607.94	$ 1,604.73	$ 1,607.74	$ 1,600.23	$ 1,604.63	$ 1,597.82
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	329.4	350.4	382.7	382.7	382.7	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 142.09	$ 151.15	$ 165.08	$ 165.08	$ 165.08	$ 151.15
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	149197	150925	151141	149198	149199	150926	149845	149413	151339	151142
Upgrade Package List	Pkg3321202054	Pkg3331201054	Pkg3331202054	Pkg3321202054	Pkg3321202054	Pkg3331201054	Pkg3321302054	Pkg3321203054	Pkg3331203053	Pkg3331202054
GHGI [kg/m2]	3.68	3.68	3.68	3.42	3.24	3.42	3.68	3.68	3.68	3.41
% ICC	5.3%	5.4%	5.4%	5.4%	5.5%	5.5%	5.4%	5.4%	5.4%	5.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	35.4	35.2	34.6	35.4	35.4	35.2	35.4	34.6	35.1	34.6
Output: MEUI [kWh/(m2 * yr)]	36.5	36.4	36.2	35	34.1	34.9	36.5	36.2	36.4	34.7
Output: Better than ERS (%)	12190.0%	12150.0%	12070.0%	11720.0%	11410.0%	11680.0%	12190.0%	12110.0%	12150.0%	11600.0%
Output: Better than Envelope (%)	5020.0%	5050.0%	5130.0%	5020.0%	5020.0%	5050.0%	5020.0%	5130.0%	5070.0%	5130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4039	4017	3968	4040	4040	4018	4039	3986	4017	3969
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 569.47	$ 566.34	$ 559.46	$ 569.58	$ 569.67	$ 566.47	$ 569.47	$ 561.98	$ 566.37	$ 559.59
Annual savings in carbon tax for electricity [$/year]	$ 2.02	$ 2.01	$ 1.98	$ 2.02	$ 2.02	$ 2.01	$ 2.02	$ 1.99	$ 2.01	$ 1.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 571.49	$ 568.35	$ 561.44	$ 571.6	$ 571.69	$ 568.48	$ 571.49	$ 563.98	$ 568.38	$ 561.57
Annual savings in GHG from electricity savings [kg CO2e/year]	44.4	44.2	43.6	44.4	44.4	44.2	44.4	43.8	44.2	43.7
Annual savings in natural gas [m3/year]	96.66	96.66	96.66	97.87	98.65	97.87	96.66	96.66	96.66	97.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 895.6	$ 895.6	$ 895.6	$ 906.75	$ 914.	$ 906.75	$ 895.6	$ 895.6	$ 895.6	$ 906.75
Annual savings in carbon tax for natural gas [$/year]	$ 223.54	$ 223.54	$ 223.54	$ 226.32	$ 228.13	$ 226.32	$ 223.54	$ 223.54	$ 223.54	$ 226.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,133.07	$ 1,142.13	$ 1,133.07	$ 1,119.13	$ 1,119.13	$ 1,119.13	$ 1,133.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	4967.5	4967.5	4967.5	5029.3	5069.5	5029.3	4967.5	4967.5	4967.5	5029.3
Net Present Value [$]	$ 16,456.79	$ 16,634.23	$ 16,729.35	$ 16,738.25	$ 16,863.98	$ 16,916.06	$ 16,917.67	$ 16,956.79	$ 16,992.27	$ 17,011.18
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	10.51	8.78	10.51	14.09	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 2,300.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$ 550.	$.	$.	$.	$ 550.

MEDIUM 25SAR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 10,730.25	$ 10,950.99	$ 11,185.58	$ 11,230.25	$ 11,280.25	$ 11,330.25	$ 11,406.32	$ 11,411.69	$ 11,450.99	$ 11,500.99
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 16,116.84	$ 16,448.39	$ 16,800.74	$ 16,867.84	$ 16,942.94	$ 17,018.04	$ 17,132.29	$ 17,140.36	$ 17,199.39	$ 17,274.49
Net Present Value [$]	$ 13,280.48	$ 13,314.62	$ 13,409.	$ 11,296.23	$ 13,449.29	$ 11,542.96	$ 13,469.49	$ 12,589.85	$ 11,356.11	$ 13,483.42
Incremental dollars per GHG saving	$ 1.83	$ 1.87	$ 1.91	$ 1.92	$ 1.9	$ 1.77	$ 1.95	$ 1.95	$ 1.95	$ 1.94
Auxiliary Energy Required Heating [GJ/yr]	80.8	80.1	79.9	74.1	80.8	81.9	79.2	79	73.5	80.1
Annual Energy DHW [GJ/yr]	26.6	26.6	26.6	26.6	24.9	15.8	26.6	26.6	26.6	24.9
Annual Energy Space Heating [GJ/yr]	41.2	40.9	40.7	37.7	41.2	41.4	40.5	39.4	37.5	40.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	95.2	95	94.8	91.8	93.6	84.6	94.6	93.3	91.5	93.3
Design Heating Load [W]	15532.1	15425.4	15427.1	14265.8	15532.1	15121.1	15320.3	14265.8	14159	15425.4
Annual Energy Electricity [kWh/yr]	19071.5	18999	18946.5	18106.8	19071.5	19107.7	18883.9	18537.6	18044	18999
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,635.3	$ 2,625.04	$ 2,617.61	$ 2,498.8	$ 2,635.3	$ 2,640.42	$ 2,608.76	$ 2,559.76	$ 2,489.91	$ 2,625.04
Annual Energy Natural Gas [m3/yr]	714.1	714.1	713.5	714	668.6	423.9	713.6	714.4	714.1	668.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 308.04	$ 308.04	$ 307.78	$ 307.99	$ 288.41	$ 182.86	$ 307.82	$ 308.17	$ 308.04	$ 288.41
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1738	2008	3358	11458	1739	1741	3628	11404	11728	2009
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131102031	Pkg2121101021	Pkg2121102031	Pkg1121102031
GHGI [kg/m2]	6.73	6.72	6.72	6.68	6.36	4.36	6.72	6.71	6.68	6.35
% ICC	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	95.7	95	94.6	87.8	95.7	97.1	93.9	93.6	87	95
Output: MEUI [kWh/(m2 * yr)]	82.3	82	81.8	78.2	80.3	69.7	81.5	80.1	77.9	80
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1190.0%	1260.0%	1290.0%	1920.0%	1190.0%	1070.0%	1360.0%	1380.0%	1980.0%	1260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11144	11071	11018	10179	11144	11180	10956	10610	10116	11071
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,571.23	$ 1,561.01	$ 1,553.61	$ 1,435.21	$ 1,571.23	$ 1,576.34	$ 1,544.78	$ 1,495.95	$ 1,426.36	$ 1,561.01
Annual savings in carbon tax for electricity [$/year]	$ 5.57	$ 5.54	$ 5.51	$ 5.09	$ 5.57	$ 5.59	$ 5.48	$ 5.3	$ 5.06	$ 5.54
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,576.81	$ 1,566.55	$ 1,559.12	$ 1,440.3	$ 1,576.81	$ 1,581.93	$ 1,550.26	$ 1,501.26	$ 1,431.41	$ 1,566.55
Annual savings in GHG from electricity savings [kg CO2e/year]	122.6	121.8	121.2	112	122.6	123	120.5	116.7	111.3	121.8
Annual savings in natural gas [m3/year]	116.27	116.27	116.29	116.27	117.96	127.08	116.29	116.26	116.27	117.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,077.21	$ 1,077.21	$ 1,077.42	$ 1,077.24	$ 1,092.92	$ 1,177.39	$ 1,077.38	$ 1,077.11	$ 1,077.21	$ 1,092.92
Annual savings in carbon tax for natural gas [$/year]	$ 268.87	$ 268.87	$ 268.92	$ 268.87	$ 272.79	$ 293.87	$ 268.91	$ 268.84	$ 268.87	$ 272.79
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,346.07	$ 1,346.07	$ 1,346.33	$ 1,346.12	$ 1,365.7	$ 1,471.26	$ 1,346.29	$ 1,345.95	$ 1,346.07	$ 1,365.7
Annual savings in GHG from natural gas savings [kg CO2e/year]	5974.8	5974.8	5976	5975	6061.9	6530.4	5975.8	5974.2	5974.8	6061.9
Net Present Value [$]	$ 13,280.48	$ 13,314.62	$ 13,409.	$ 11,296.23	$ 13,449.29	$ 11,542.96	$ 13,469.49	$ 12,589.85	$ 11,356.11	$ 13,483.42
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 2,056.32	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$ 550.

MEDIUM 25SAR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,604.25	$ 11,330.25	$ 12,824.99	$ 11,550.99	$ 13,059.58	$ 13,154.25	$ 11,880.25	$ 10,730.25	$ 11,785.58	$ 11,830.25
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 18,931.58	$ 17,018.04	$ 19,263.13	$ 17,349.59	$ 19,615.49	$ 19,757.68	$ 17,844.14	$ 16,116.84	$ 17,701.94	$ 17,769.04
Net Present Value [$]	$ 15,049.51	$ 11,542.96	$ 15,109.95	$ 11,572.71	$ 15,212.16	$ 14,977.08	$ 11,771.71	$ 13,280.48	$ 11,701.95	$ 9,605.63
Incremental dollars per GHG saving	$ 1.75	$ 1.77	$ 1.78	$ 1.8	$ 1.82	$ 1.83	$ 1.83	$ 1.83	$ 1.84	$ 1.84
Auxiliary Energy Required Heating [GJ/yr]	80.8	81.9	80.2	81.3	79.9	80.5	81.9	80.8	81	75.3
Annual Energy DHW [GJ/yr]	9.1	15.8	9.1	15.8	9.1	8.4	14.3	26.6	15.8	15.8
Annual Energy Space Heating [GJ/yr]	40.4	41.4	40.2	41.2	40	40.3	41.4	41.2	41	37.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	76.9	84.6	76.7	84.3	76.5	76	83.1	95.2	84.2	81.2
Design Heating Load [W]	14265.8	15121.1	14159	15014.3	14160.7	14265.8	15121.1	15532.1	15016	13861.4
Annual Energy Electricity [kWh/yr]	21354.1	19107.7	21291.8	19033.5	21240.4	21112.3	19109.1	19071.5	18992.6	18161
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,958.29	$ 2,640.42	$ 2,949.47	$ 2,629.93	$ 2,942.2	$ 2,924.08	$ 2,640.62	$ 2,635.3	$ 2,624.14	$ 2,506.47
Annual Energy Natural Gas [m3/yr]	0	423.9	0	423.9	0	0	385.1	714.1	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 182.86	$.	$ 182.86	$.	$.	$ 166.12	$ 308.04	$ 182.86	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	1741	11734	2011	13084	11465	1742	1738	3361	11461
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg1121102031	Pkg2131101031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131101031	Pkg2121101031
GHGI [kg/m2]	1	4.36	1	4.36	1	0.99	4.04	6.73	4.35	4.31
% ICC	2.4%	2.2%	2.5%	2.2%	2.5%	2.5%	2.3%	2.1%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	95.8	97.1	95	96.3	94.7	95.4	97.1	95.7	96	89.2
Output: MEUI [kWh/(m2 * yr)]	60.6	69.7	60.3	69.4	60.1	59.5	68	82.3	69.2	65.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1190.0%	1070.0%	1250.0%	1130.0%	1290.0%	1220.0%	1070.0%	1190.0%	1170.0%	1790.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13426	11180	13364	11106	13312	13184	11181	11144	11065	10233
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,893.08	$ 1,576.34	$ 1,884.3	$ 1,565.88	$ 1,877.05	$ 1,858.99	$ 1,576.54	$ 1,571.23	$ 1,560.11	$ 1,442.85
Annual savings in carbon tax for electricity [$/year]	$ 6.71	$ 5.59	$ 6.68	$ 5.55	$ 6.66	$ 6.59	$ 5.59	$ 5.57	$ 5.53	$ 5.12
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,899.79	$ 1,581.93	$ 1,890.98	$ 1,571.43	$ 1,883.7	$ 1,865.58	$ 1,582.13	$ 1,576.81	$ 1,565.64	$ 1,447.97
Annual savings in GHG from electricity savings [kg CO2e/year]	147.7	123	147	122.2	146.4	145	123	122.6	121.7	112.6
Annual savings in natural gas [m3/year]	142.87	127.08	142.87	127.08	142.87	142.87	128.52	116.27	127.08	127.08
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,323.72	$ 1,177.39	$ 1,323.72	$ 1,177.39	$ 1,323.72	$ 1,323.72	$ 1,190.78	$ 1,077.21	$ 1,177.39	$ 1,177.39
Annual savings in carbon tax for natural gas [$/year]	$ 330.39	$ 293.87	$ 330.39	$ 293.87	$ 330.39	$ 330.39	$ 297.21	$ 268.87	$ 293.87	$ 293.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,654.11	$ 1,471.26	$ 1,654.11	$ 1,471.26	$ 1,654.11	$ 1,654.11	$ 1,487.99	$ 1,346.07	$ 1,471.26	$ 1,471.26
Annual savings in GHG from natural gas savings [kg CO2e/year]	7342.1	6530.4	7342.1	6530.4	7342.1	7342.1	6604.7	5974.8	6530.4	6530.4
Net Present Value [$]	$ 15,049.51	$ 11,542.96	$ 15,109.95	$ 11,572.71	$ 15,212.16	$ 14,977.08	$ 11,771.71	$ 13,280.48	$ 11,701.95	$ 9,605.63
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.

MEDIUM 25SAR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,780.16	$ 16,000.9	$ 15,340.16	$ 15,560.9	$ 15,163.62	$ 16,280.16	$ 15,213.62	$ 16,330.16	$ 15,292.88	$ 16,235.49
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,701.8	$ 24,033.35	$ 23,040.92	$ 23,372.47	$ 22,775.76	$ 24,452.8	$ 22,850.86	$ 24,527.9	$ 22,969.91	$ 24,385.71
Net Present Value [$]	$ 141.76	$ 203.96	$ 220.14	$ 282.16	$ 315.78	$ 338.76	$ 347.57	$ 369.46	$ 372.02	$ 372.96
Incremental dollars per GHG saving	$ 4.44	$ 4.46	$ 4.46	$ 4.48	$ 4.49	$ 4.5	$ 4.49	$ 4.51	$ 4.5	$ 4.51
Auxiliary Energy Required Heating [GJ/yr]	55.7	55.1	57.8	57.2	58.9	54.5	60.2	55.7	60.8	54.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	14.3	14.3	13.4	15.8
Annual Energy Space Heating [GJ/yr]	59	58.3	61.2	60.6	62.4	57.7	63.7	59	64.4	58.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	102.1	101.5	104.4	103.7	105.5	100.8	105.4	100.7	105.1	101.2
Design Heating Load [W]	10617.8	10511.1	10827.6	10720.8	11073.7	10572.9	11118.6	10617.8	11225.4	10512.8
Annual Energy Electricity [kWh/yr]	7886	7882.7	7897.1	7893.7	7902.9	7879.6	7909.5	7886.1	7912.9	7881.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,052.55	$ 1,052.09	$ 1,054.12	$ 1,053.64	$ 1,054.95	$ 1,051.65	$ 1,055.88	$ 1,052.57	$ 1,056.36	$ 1,051.89
Annual Energy Natural Gas [m3/yr]	1980.5	1962.6	2039	2021.1	2069.7	1946.3	2065.5	1942	2057.9	1955.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 854.32	$ 846.6	$ 879.55	$ 871.83	$ 892.8	$ 839.57	$ 890.98	$ 837.71	$ 887.71	$ 843.41
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43438	43654	43420	43636	35896	43456	35879	43439	35664	45382
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3321201032	Pkg3321202032	Pkg3321202034	Pkg3321201034	Pkg3321202033	Pkg3321201033	Pkg3321201033	Pkg3331201033
GHGI [kg/m2]	16.55	16.4	17.03	16.88	17.28	16.27	17.24	16.23	17.18	16.34
% ICC	3.0%	3.1%	2.9%	3.0%	2.9%	3.1%	2.9%	3.1%	2.9%	3.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	66	65.3	68.5	67.8	69.8	64.6	71.3	66.1	72.1	65
Output: MEUI [kWh/(m2 * yr)]	90.7	89.9	93.3	92.5	94.7	89.1	94.5	89	94.2	89.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	3930.0%	3990.0%	3700.0%	3760.0%	3580.0%	4060.0%	3440.0%	3930.0%	3370.0%	4020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	42	45	31	34	25	48	18	42	15	47
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5.92	$ 6.39	$ 4.36	$ 4.84	$ 3.54	$ 6.82	$ 2.61	$ 5.91	$ 2.13	$ 6.58
Annual savings in carbon tax for electricity [$/year]	$ .02	$ .02	$ .02	$ .02	$ .01	$ .02	$ .01	$ .02	$ .01	$ .02
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5.94	$ 6.41	$ 4.37	$ 4.85	$ 3.55	$ 6.85	$ 2.62	$ 5.93	$ 2.14	$ 6.61
Annual savings in GHG from electricity savings [kg CO2e/year]	0.5	0.5	0.3	0.4	0.3	0.5	0.2	0.5	0.2	0.5
Annual savings in natural gas [m3/year]	69.08	69.75	66.9	67.57	65.76	70.36	65.91	70.52	66.2	70.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 640.04	$ 646.22	$ 619.85	$ 626.03	$ 609.25	$ 651.85	$ 610.7	$ 653.33	$ 613.32	$ 648.78
Annual savings in carbon tax for natural gas [$/year]	$ 159.75	$ 161.29	$ 154.71	$ 156.25	$ 152.07	$ 162.7	$ 152.43	$ 163.07	$ 153.08	$ 161.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 799.79	$ 807.52	$ 774.56	$ 782.28	$ 761.32	$ 814.55	$ 763.13	$ 816.4	$ 766.41	$ 810.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	3550	3584.3	3438	3472.3	3379.2	3615.5	3387.3	3623.8	3401.8	3598.5
Net Present Value [$]	$ 141.76	$ 203.96	$ 220.14	$ 282.16	$ 315.78	$ 338.76	$ 347.57	$ 369.46	$ 372.02	$ 372.96
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	10.51	8.78	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	5.28	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.

MEDIUM 25SAR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 12,535.58	$ 12,756.32	$ 13,190.25	$ 13,236.17	$ 13,410.99	$ 13,456.91	$ 13,630.25	$ 13,645.58	$ 13,660.99	$ 13,691.5
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 18,828.44	$ 19,159.99	$ 19,811.76	$ 19,880.73	$ 20,143.31	$ 20,212.28	$ 20,472.64	$ 20,495.66	$ 20,518.81	$ 20,564.63
Net Present Value [$]	$ 11,671.03	$ 11,703.4	$ 11,067.88	$ 10,874.98	$ 11,098.36	$ 10,908.75	$ 10,829.21	$ 11,227.97	$ 13,073.33	$ 11,038.79
Incremental dollars per GHG saving	$ 2.09	$ 2.12	$ 2.06	$ 2.25	$ 2.09	$ 2.29	$ 2.12	$ 2.13	$ 2.27	$ 2.33
Auxiliary Energy Required Heating [GJ/yr]	73.2	72.5	73.4	66.6	72.7	66	71.2	72.5	71.6	65.7
Annual Energy DHW [GJ/yr]	23.8	23.8	15.8	26.6	15.8	26.6	15.8	15.8	23.8	26.6
Annual Energy Space Heating [GJ/yr]	37.3	37	37.1	34.2	36.8	33.9	36.1	36.7	36.6	33.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	1.7	0.8	1.7	0.8	1.7	1.7	1.7	0.8
Total Energy [GJ/yr]	88.5	88.3	81.3	88.4	81	88.1	80.4	80.9	88.9	88
Design Heating Load [W]	14160.7	14054	13037.3	13382.1	12930.5	13275.3	12827.5	12932.3	13334.9	13277
Annual Energy Electricity [kWh/yr]	17993.3	17919.8	18200.7	17162.4	18126.8	17089.5	17937.1	18086	18097.3	17050.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,482.74	$ 2,472.34	$ 2,512.08	$ 2,365.16	$ 2,501.63	$ 2,354.85	$ 2,474.78	$ 2,495.85	$ 2,497.45	$ 2,349.37
Annual Energy Natural Gas [m3/yr]	637.8	637.9	423.9	714.5	423.9	714.6	423.9	423.9	638.9	714
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.12	$ 275.17	$ 182.86	$ 308.21	$ 182.86	$ 308.25	$ 182.86	$ 182.86	$ 275.6	$ 307.99
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	13080	13350	11479	17830	11749	18100	11497	13099	11748	20962
Upgrade Package List	Pkg2131101031	Pkg2131102031	Pkg2121101032	Pkg2221101031	Pkg2121102032	Pkg2221102031	Pkg2121101033	Pkg2131101032	Pkg2121102032	Pkg2231101031
GHGI [kg/m2]	6.05	4.32	6.64	6.64	4.31	6.64	4.3	4.31	6.07	6.63
% ICC	2.4%	2.4%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	86.7	85.9	87	79	86.2	78.2	84.4	85.9	84.8	77.9
Output: MEUI [kWh/(m2 * yr)]	74.4	74.1	65.8	74.2	65.5	73.9	64.7	65.3	74.9	73.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2020.0%	2090.0%	2000.0%	2740.0%	2070.0%	2800.0%	2240.0%	2090.0%	2190.0%	2840.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10065	9992	10273	9234	10199	9162	10009	10158	10169	9123
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,419.21	$ 1,408.84	$ 1,448.45	$ 1,302.05	$ 1,438.03	$ 1,291.77	$ 1,411.28	$ 1,432.28	$ 1,433.87	$ 1,286.31
Annual savings in carbon tax for electricity [$/year]	$ 5.03	$ 5.	$ 5.14	$ 4.62	$ 5.1	$ 4.58	$ 5.	$ 5.08	$ 5.08	$ 4.56
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,424.24	$ 1,413.84	$ 1,453.59	$ 1,306.67	$ 1,443.13	$ 1,296.35	$ 1,416.29	$ 1,437.36	$ 1,438.96	$ 1,290.88
Annual savings in GHG from electricity savings [kg CO2e/year]	110.7	109.9	113	101.6	112.2	100.8	110.1	111.7	111.9	100.4
Annual savings in natural gas [m3/year]	119.11	119.11	127.08	116.25	127.08	116.25	127.08	127.08	119.07	116.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,103.55	$ 1,103.51	$ 1,177.39	$ 1,077.07	$ 1,177.39	$ 1,077.04	$ 1,177.39	$ 1,177.39	$ 1,103.17	$ 1,077.24
Annual savings in carbon tax for natural gas [$/year]	$ 275.44	$ 275.43	$ 293.87	$ 268.83	$ 293.87	$ 268.82	$ 293.87	$ 293.87	$ 275.35	$ 268.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,378.99	$ 1,378.94	$ 1,471.26	$ 1,345.9	$ 1,471.26	$ 1,345.86	$ 1,471.26	$ 1,471.26	$ 1,378.51	$ 1,346.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	6120.9	6120.7	6530.4	5974	6530.4	5973.8	6530.4	6530.4	6118.8	5975
Net Present Value [$]	$ 11,671.03	$ 11,703.4	$ 11,067.88	$ 10,874.98	$ 11,098.36	$ 10,908.75	$ 10,829.21	$ 11,227.97	$ 13,073.33	$ 11,038.79
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	5.28	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 4,318.3	$ 4,318.3	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	HRV sre 60	NA	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$ 1,360.	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$.	$.	$.	$.	$.	$.	$ 850.	$.

MEDIUM 25SAR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 14,610.17	$ 13,190.25	$ 14,830.91	$ 12,535.58	$ 13,410.99	$ 15,065.5	$ 15,160.17	$ 13,740.25	$ 15,286.24	$ 12,756.32
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,944.48	$ 19,811.76	$ 22,276.03	$ 18,828.44	$ 20,143.31	$ 22,628.38	$ 22,770.58	$ 20,637.86	$ 22,959.93	$ 19,159.99
Net Present Value [$]	$ 14,536.31	$ 11,067.88	$ 14,591.99	$ 11,671.03	$ 11,098.36	$ 14,695.12	$ 14,451.46	$ 11,296.63	$ 14,721.23	$ 11,703.4
Incremental dollars per GHG saving	$ 2.03	$ 2.06	$ 2.06	$ 2.09	$ 2.09	$ 2.09	$ 2.1	$ 2.12	$ 2.12	$ 2.12
Auxiliary Energy Required Heating [GJ/yr]	73.2	73.4	72.5	73.2	72.7	72.3	72.8	73.4	71.6	72.5
Annual Energy DHW [GJ/yr]	9.1	15.8	9.1	23.8	15.8	9.1	8.4	14.3	9.1	23.8
Annual Energy Space Heating [GJ/yr]	36.9	37.1	36.6	37.3	36.8	36.5	36.7	37.1	36.2	37
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	1.7	0.8	0.8	1.7	0.8	0.8	1.7	0.8	0.8
Total Energy [GJ/yr]	73.4	81.3	73.1	88.5	81	72.9	72.5	79.9	72.7	88.3
Design Heating Load [W]	13382.1	13037.3	13275.3	14160.7	12930.5	13277	13382.1	13037.3	13170.2	14054
Annual Energy Electricity [kWh/yr]	20375.6	20311.5	17993.3	18126.8	20260.4	20129	18202.1	18202.1	20184.8	17919.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,819.83	$ 2,512.08	$ 2,810.76	$ 2,482.74	$ 2,501.63	$ 2,803.53	$ 2,784.94	$ 2,512.28	$ 2,792.83	$ 2,472.34
Annual Energy Natural Gas [m3/yr]	0	423.9	0	637.8	423.9	0	0	385.1	0	637.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 182.86	$.	$ 275.12	$ 182.86	$.	$.	$ 166.12	$.	$ 275.17
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17836	11479	18106	13080	11749	20968	17837	11480	21238	13350
Upgrade Package List	Pkg2221101031	Pkg2121101032	Pkg2221102031	Pkg2131101031	Pkg2121102032	Pkg2231101031	Pkg2221101031	Pkg2121101032	Pkg2231102031	Pkg2131102031
GHGI [kg/m2]	0.96	4.32	0.95	6.05	4.31	0.95	0.94	4	0.95	6.05
% ICC	2.8%	2.5%	2.8%	2.4%	2.6%	2.9%	2.9%	2.6%	2.9%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	86.7	87	86	86.7	86.2	85.7	86.3	87	84.9	85.9
Output: MEUI [kWh/(m2 * yr)]	56.4	65.8	56.1	74.4	65.5	55.9	55.3	64.1	55.6	74.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2020.0%	2000.0%	2090.0%	2020.0%	2070.0%	2120.0%	2060.0%	2000.0%	2190.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12448	10273	12384	10065	10199	12332	12201	10274	12257	9992
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,755.11	$ 1,448.45	$ 1,746.07	$ 1,419.21	$ 1,438.03	$ 1,738.87	$ 1,720.34	$ 1,448.65	$ 1,728.21	$ 1,408.84
Annual savings in carbon tax for electricity [$/year]	$ 6.22	$ 5.14	$ 6.19	$ 5.03	$ 5.1	$ 6.17	$ 6.1	$ 5.14	$ 6.13	$ 5.
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,761.34	$ 1,453.59	$ 1,752.27	$ 1,424.24	$ 1,443.13	$ 1,745.03	$ 1,726.44	$ 1,453.79	$ 1,734.34	$ 1,413.84
Annual savings in GHG from electricity savings [kg CO2e/year]	136.9	113	136.2	110.7	112.2	135.7	134.2	113	134.8	109.9
Annual savings in natural gas [m3/year]	142.87	127.08	142.87	119.11	127.08	142.87	142.87	128.52	142.87	119.11
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,323.72	$ 1,177.39	$ 1,323.72	$ 1,103.55	$ 1,177.39	$ 1,323.72	$ 1,323.72	$ 1,190.78	$ 1,323.72	$ 1,103.51
Annual savings in carbon tax for natural gas [$/year]	$ 330.39	$ 293.87	$ 330.39	$ 275.44	$ 293.87	$ 330.39	$ 330.39	$ 297.21	$ 330.39	$ 275.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,654.11	$ 1,471.26	$ 1,654.11	$ 1,378.99	$ 1,471.26	$ 1,654.11	$ 1,654.11	$ 1,487.99	$ 1,654.11	$ 1,378.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	7342.1	6530.4	7342.1	6120.9	6530.4	7342.1	7342.1	6604.7	7342.1	6120.7
Net Present Value [$]	$ 14,536.31	$ 11,067.88	$ 14,591.99	$ 11,671.03	$ 11,098.36	$ 14,695.12	$ 14,451.46	$ 11,296.63	$ 14,721.23	$ 11,703.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	8.78	10.51	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88	$ 1,874.88
Above Grade Wall Code	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	3.87	5.28	3.87	3.87	5.28	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 4,318.3	$ 4,318.3	$ 6,324.22	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 4,318.3
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 60	NA	NA	HRV sre 60	NA	NA	HRV sre 60	NA	NA
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$.	$.	$ 1,360.	$.	$.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 1,374.	$.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$.	$.	$ 550.	$ 550.	$.	$ 850.

MEDIUM 25SAR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 28,043.46	$ 28,339.74	$ 28,480.08	$ 28,616.83	$ 28,776.36	$ 28,816.83	$ 29,116.83	$ 13,836.17	$ 14,056.91	$ 28,913.11
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 42,121.28	$ 42,566.29	$ 42,777.08	$ 42,982.48	$ 43,222.09	$ 43,282.88	$ 43,733.48	$ 20,781.93	$ 21,113.48	$ 43,427.49
Net Present Value [$]	$ 8,181.38	$ 8,477.66	$ 8,671.88	$ 8,895.39	$ 8,968.16	$ 9,021.57	$ 9,108.41	$ 9,110.87	$ 9,159.79	$ 9,191.67
Incremental dollars per GHG saving	$ 6.27	$ 6.34	$ 6.39	$ 6.45	$ 6.45	$ 6.47	$ 6.47	$ 2.15	$ 2.19	$ 6.51
Auxiliary Energy Required Heating [GJ/yr]	40.8	40.8	41.1	41.4	41.1	40.3	40.3	67.8	67.1	41.4
Annual Energy DHW [GJ/yr]	13.4	13.4	13.4	13.4	13.4	14.3	13.4	15.8	15.8	13.4
Annual Energy Space Heating [GJ/yr]	43.3	43.3	43.5	43.9	43.5	42.6	42.6	34.4	34.2	43.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	0.8	0.8	1.7
Total Energy [GJ/yr]	84	84	84.2	84.6	84.2	84.3	83.4	77.7	77.4	84.6
Design Heating Load [W]	8736.7	8736.7	8726.6	8708.7	8726.6	8663.8	8663.8	12977.7	12870.9	8708.7
Annual Energy Electricity [kWh/yr]	7807.4	7807.4	7808.6	7810.4	7808.6	7804.2	7804.3	17189.6	17122.9	7810.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,041.43	$ 1,041.43	$ 1,041.6	$ 1,041.86	$ 1,041.6	$ 1,040.98	$ 1,040.99	$ 2,369.01	$ 2,359.58	$ 1,041.86
Annual Energy Natural Gas [m3/yr]	1500.4	1500.4	1506.5	1516.3	1506.5	1509.4	1483.9	423.9	423.9	1516.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 647.22	$ 647.22	$ 649.85	$ 654.08	$ 649.85	$ 651.1	$ 640.1	$ 182.86	$ 182.86	$ 654.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51792	52080	52224	52350	52512	52367	52368	17833	18103	52638
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4341302054	Pkg4341303053	Pkg4341402054	Pkg4341303054	Pkg4341303054	Pkg2221101031	Pkg2221102031	Pkg4341403053
GHGI [kg/m2]	12.62	12.62	12.67	12.75	12.67	12.7	12.49	4.27	4.27	12.75
% ICC	5.4%	5.4%	5.4%	5.5%	5.5%	5.5%	5.6%	2.6%	2.7%	5.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 5	ACH 1 5	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	48.4	48.4	48.7	49.1	48.7	47.7	47.7	80.3	79.5	49.1
Output: MEUI [kWh/(m2 * yr)]	69.2	69.2	69.4	69.9	69.4	69.5	68.4	61.5	61.2	69.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5550.0%	5550.0%	5520.0%	5490.0%	5520.0%	5610.0%	5610.0%	2610.0%	2680.0%	5490.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	121	121	119	118	119	124	124	9262	9195	118
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 17.	$ 17.	$ 16.84	$ 16.58	$ 16.84	$ 17.46	$ 17.44	$ 1,305.89	$ 1,296.48	$ 16.58
Annual savings in carbon tax for electricity [$/year]	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ 4.63	$ 4.6	$ .06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 17.06	$ 17.06	$ 16.9	$ 16.64	$ 16.9	$ 17.52	$ 17.5	$ 1,310.52	$ 1,301.08	$ 16.64
Annual savings in GHG from electricity savings [kg CO2e/year]	1.3	1.3	1.3	1.3	1.3	1.4	1.4	101.9	101.1	1.3
Annual savings in natural gas [m3/year]	86.97	86.97	86.74	86.38	86.74	86.63	87.58	127.08	127.08	86.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 805.77	$ 805.77	$ 803.67	$ 800.29	$ 803.67	$ 802.67	$ 811.47	$ 1,177.39	$ 1,177.39	$ 800.29
Annual savings in carbon tax for natural gas [$/year]	$ 201.12	$ 201.12	$ 200.59	$ 199.75	$ 200.59	$ 200.34	$ 202.54	$ 293.87	$ 293.87	$ 199.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,006.89	$ 1,006.89	$ 1,004.26	$ 1,000.03	$ 1,004.26	$ 1,003.01	$ 1,014.01	$ 1,471.26	$ 1,471.26	$ 1,000.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	4469.3	4469.3	4457.6	4438.8	4457.6	4452	4500.9	6530.4	6530.4	4438.8
Net Present Value [$]	$ 8,181.38	$ 8,477.66	$ 8,671.88	$ 8,895.39	$ 8,968.16	$ 9,021.57	$ 9,108.41	$ 9,110.87	$ 9,159.79	$ 9,191.67
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.51	14.09	10.51	14.09	14.09	8.78	10.51	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR50	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 305.64	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 1,874.88	$ 1,874.88	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 6,324.22	$ 6,324.22	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 786.76	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 331.43	$ 331.43	$ 1,860.13
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	NA	NA	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$.	$.	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	BC CCASHP	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 3,150.	$ 3,150.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$.	$.	$ 850.

MEDIUM 25SAR Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 27,525.09	$ 27,540.5	$ 27,569.76	$ 27,745.83	$ 27,775.09	$ 27,790.5	$ 27,819.76	$ 27,927.25	$ 27,985.97	$ 27,995.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,342.69	$ 41,365.83	$ 41,409.78	$ 41,674.24	$ 41,718.19	$ 41,741.33	$ 41,785.28	$ 41,946.73	$ 42,034.93	$ 42,049.74
Net Present Value [$]	$ 16,086.32	$ 17,950.03	$ 16,123.32	$ 16,138.35	$ 18,076.37	$ 16,140.11	$ 18,087.66	$ 16,381.67	$ 16,547.2	$ 18,126.57
Incremental dollars per GHG saving	$ 4.26	$ 4.56	$ 4.27	$ 4.3	$ 4.59	$ 4.3	$ 4.6	$ 4.33	$ 4.33	$ 4.63
Auxiliary Energy Required Heating [GJ/yr]	45.7	44.9	45.4	45.1	44.7	44.8	44.4	45.1	45.7	44.1
Annual Energy DHW [GJ/yr]	15.8	23.8	15.8	15.8	23.8	15.8	23.8	15.8	15.8	23.8
Annual Energy Space Heating [GJ/yr]	23.9	23.9	23.9	23.7	23.7	23.6	23.7	23.8	23.9	23.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	68.3	76.4	68.3	68	76.2	68	76.2	68.1	68.3	76
Design Heating Load [W]	9534.4	9921.5	9594.5	9427.7	9923.2	9487.8	9983.3	9469.9	9534.4	9816.5
Annual Energy Electricity [kWh/yr]	14581.9	14597	14578.9	14516.4	14557.2	14499.7	14541.3	14540.4	14581.9	14490.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,000.02	$ 2,002.16	$ 1,999.6	$ 1,990.76	$ 1,996.53	$ 1,988.39	$ 1,994.28	$ 1,994.15	$ 2,000.02	$ 1,987.12
Annual Energy Natural Gas [m3/yr]	423.9	639.9	423.9	423.9	639.2	423.9	640.1	423.9	423.9	639.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 276.03	$ 182.86	$ 182.86	$ 275.73	$ 182.86	$ 276.12	$ 182.86	$ 182.86	$ 275.77
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45499	43770	43573	45715	45498	43789	43572	43987	46147	45714
Upgrade Package List	Pkg3331201053	Pkg3321202053	Pkg3321201054	Pkg3331202053	Pkg3331201053	Pkg3321202054	Pkg3321201054	Pkg3321203053	Pkg3331301053	Pkg3331202053
GHGI [kg/m2]	4.15	5.91	4.15	4.14	5.9	4.14	5.91	4.15	4.15	5.9
% ICC	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	54.2	53.3	53.8	53.5	53	53.1	52.6	53.5	54.2	52.2
Output: MEUI [kWh/(m2 * yr)]	50.4	60	50.4	50.1	59.8	50	59.7	50.2	50.4	59.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5100.0%	5050.0%	5080.0%	5130.0%	5110.0%	5160.0%	5080.0%	5020.0%	5190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6654	6669	6651	6588	6629	6572	6613	6612	6654	6563
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 938.2	$ 940.33	$ 937.78	$ 928.96	$ 934.72	$ 926.61	$ 932.48	$ 932.35	$ 938.2	$ 925.34
Annual savings in carbon tax for electricity [$/year]	$ 3.33	$ 3.33	$ 3.33	$ 3.29	$ 3.31	$ 3.29	$ 3.31	$ 3.31	$ 3.33	$ 3.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 941.53	$ 943.66	$ 941.1	$ 932.26	$ 938.03	$ 929.9	$ 935.78	$ 935.65	$ 941.53	$ 928.62
Annual savings in GHG from electricity savings [kg CO2e/year]	73.2	73.4	73.2	72.5	72.9	72.3	72.7	72.7	73.2	72.2
Annual savings in natural gas [m3/year]	127.08	119.03	127.08	127.08	119.06	127.08	119.02	127.08	127.08	119.05
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,177.39	$ 1,102.82	$ 1,177.39	$ 1,177.39	$ 1,103.06	$ 1,177.39	$ 1,102.75	$ 1,177.39	$ 1,177.39	$ 1,103.03
Annual savings in carbon tax for natural gas [$/year]	$ 293.87	$ 275.26	$ 293.87	$ 293.87	$ 275.32	$ 293.87	$ 275.24	$ 293.87	$ 293.87	$ 275.31
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,471.26	$ 1,378.08	$ 1,471.26	$ 1,471.26	$ 1,378.38	$ 1,471.26	$ 1,378.	$ 1,471.26	$ 1,471.26	$ 1,378.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	6530.4	6116.9	6530.4	6530.4	6118.2	6530.4	6116.5	6530.4	6530.4	6118
Net Present Value [$]	$ 16,086.32	$ 17,950.03	$ 16,123.32	$ 16,138.35	$ 18,076.37	$ 16,140.11	$ 18,087.66	$ 16,381.67	$ 16,547.2	$ 18,126.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	10.51	8.78	14.09	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 1,163.13	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 55	NA	NA	DWHR eff 55	NA	DWHR eff 55	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$.	$.	$ 850.	$.	$ 850.	$.	$.	$ 850.

MEDIUM 25SAR Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 27,525.09	$ 27,569.76	$ 27,745.83	$ 31,117.46	$ 28,075.09	$ 27,790.5	$ 28,119.76	$ 28,375.09	$ 28,419.76	$ 31,330.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,342.69	$ 41,409.78	$ 41,674.24	$ 46,738.42	$ 42,168.79	$ 41,741.33	$ 42,235.88	$ 42,619.39	$ 42,686.48	$ 47,058.73
Net Present Value [$]	$ 16,086.32	$ 16,123.32	$ 16,138.35	$ 22,531.67	$ 16,315.07	$ 16,140.11	$ 16,351.7	$ 16,401.85	$ 16,438.85	$ 21,935.34
Incremental dollars per GHG saving	$ 4.26	$ 4.27	$ 4.3	$ 4.3	$ 4.3	$ 4.3	$ 4.31	$ 4.31	$ 4.32	$ 4.32
Auxiliary Energy Required Heating [GJ/yr]	45.7	45.4	45.1	45.4	45.7	44.8	45.4	45.8	45.4	45.7
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	9.1	14.3	15.8	14.3	13.4	13.4	7.9
Annual Energy Space Heating [GJ/yr]	23.9	23.9	23.7	23.8	24	23.6	23.9	24	23.9	23.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	68.3	68	68	61.4	66.8	68	66.8	65.9	65.9	60.3
Design Heating Load [W]	9534.4	9594.5	9427.7	9167.6	9534.4	9487.8	9594.5	9534.4	9594.5	9230.4
Annual Energy Electricity [kWh/yr]	14581.9	14578.9	14516.4	17069.3	14583.3	14499.7	14580.2	14584.1	14581.1	16754.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,000.02	$ 1,999.6	$ 1,990.76	$ 2,351.99	$ 2,000.22	$ 1,988.39	$ 1,999.78	$ 2,000.34	$ 1,999.91	$ 2,307.49
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	0	385.1	423.9	385.1	359.4	359.4	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$.	$ 166.12	$ 182.86	$ 166.12	$ 155.03	$ 155.03	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45499	43573	45715	51802	45500	43789	43574	45501	43575	51660
Upgrade Package List	Pkg3331201053	Pkg3321201054	Pkg3331202053	Pkg4331303054	Pkg3331201053	Pkg3321202054	Pkg3321201054	Pkg3331201053	Pkg3321201054	Pkg4331302054
GHGI [kg/m2]	4.15	4.15	4.14	0.8	3.83	4.14	3.83	3.62	3.62	0.79
% ICC	5.3%	5.3%	5.3%	6.0%	5.4%	5.3%	5.4%	5.4%	5.4%	6.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	54.2	53.8	53.5	53.7	54.2	53.1	53.8	54.2	53.8	54.1
Output: MEUI [kWh/(m2 * yr)]	50.4	50.4	50.1	42.3	48.7	50	48.6	47.5	47.5	40.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5050.0%	5080.0%	5050.0%	5020.0%	5110.0%	5050.0%	5010.0%	5050.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6654	6651	6588	9141	6655	6572	6652	6656	6653	8827
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 938.2	$ 937.78	$ 928.96	$ 1,288.92	$ 938.4	$ 926.61	$ 937.96	$ 938.51	$ 938.09	$ 1,244.58
Annual savings in carbon tax for electricity [$/year]	$ 3.33	$ 3.33	$ 3.29	$ 4.57	$ 3.33	$ 3.29	$ 3.33	$ 3.33	$ 3.33	$ 4.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 941.53	$ 941.1	$ 932.26	$ 1,293.49	$ 941.72	$ 929.9	$ 941.29	$ 941.84	$ 941.41	$ 1,248.99
Annual savings in GHG from electricity savings [kg CO2e/year]	73.2	73.2	72.5	100.6	73.2	72.3	73.2	73.2	73.2	97.1
Annual savings in natural gas [m3/year]	127.08	127.08	127.08	142.87	128.52	127.08	128.52	129.48	129.48	142.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,177.39	$ 1,177.39	$ 1,177.39	$ 1,323.72	$ 1,190.78	$ 1,177.39	$ 1,190.78	$ 1,199.65	$ 1,199.65	$ 1,323.72
Annual savings in carbon tax for natural gas [$/year]	$ 293.87	$ 293.87	$ 293.87	$ 330.39	$ 297.21	$ 293.87	$ 297.21	$ 299.43	$ 299.43	$ 330.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,471.26	$ 1,471.26	$ 1,471.26	$ 1,654.11	$ 1,487.99	$ 1,471.26	$ 1,487.99	$ 1,499.08	$ 1,499.08	$ 1,654.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	6530.4	6530.4	6530.4	7342.1	6604.7	6530.4	6604.7	6653.9	6653.9	7342.1
Net Present Value [$]	$ 16,086.32	$ 16,123.32	$ 16,138.35	$ 22,531.67	$ 16,315.07	$ 16,140.11	$ 16,351.7	$ 16,401.85	$ 16,438.85	$ 21,935.34
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	14.09	8.78	10.51	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 1,163.13	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 850.

MEDIUM 25SAR Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,525.09	$ 27,569.76	$ 27,745.83	$ 27,790.5	$ 28,025.09	$ 28,245.83	$ 28,075.09	$ 28,119.76	$ 28,295.83	$ 28,340.5
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,342.69	$ 41,409.78	$ 41,674.24	$ 41,741.33	$ 42,093.69	$ 42,425.24	$ 42,168.79	$ 42,235.88	$ 42,500.34	$ 42,567.43
Net Present Value [$]	$ 16,086.32	$ 16,123.32	$ 16,138.35	$ 16,140.11	$ 16,271.91	$ 16,314.63	$ 16,315.07	$ 16,351.7	$ 16,367.1	$ 16,368.49
Incremental dollars per GHG saving	$ 4.26	$ 4.27	$ 4.3	$ 4.3	$ 4.34	$ 4.37	$ 4.3	$ 4.31	$ 4.33	$ 4.34
Auxiliary Energy Required Heating [GJ/yr]	45.7	45.4	45.1	44.8	44.6	43.9	45.7	45.4	45.1	44.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	14.3	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	23.9	23.9	23.7	23.6	23.5	23.3	24	23.9	23.7	23.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	68.3	68.3	68	68	67.8	67.6	66.8	66.8	66.6	66.5
Design Heating Load [W]	9534.4	9594.5	9427.7	9487.8	9489.5	9382.7	9534.4	9594.5	9427.7	9487.8
Annual Energy Electricity [kWh/yr]	14581.9	14578.9	14516.4	14499.7	14459.8	14390.6	14583.3	14580.2	14517.8	14501
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,000.02	$ 1,999.6	$ 1,990.76	$ 1,988.39	$ 1,982.75	$ 1,972.95	$ 2,000.22	$ 1,999.78	$ 1,990.95	$ 1,988.58
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	385.1	385.1	385.1	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 166.12	$ 166.12
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45499	43573	45715	43789	45517	45733	45500	43574	45716	43790
Upgrade Package List	Pkg3331201053	Pkg3321201054	Pkg3331202053	Pkg3321202054	Pkg3331201054	Pkg3331202054	Pkg3331201053	Pkg3321201054	Pkg3331202053	Pkg3321202054
GHGI [kg/m2]	4.15	4.15	4.14	4.14	4.14	4.14	3.83	3.83	3.83	3.83
% ICC	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	54.2	53.8	53.5	53.1	52.8	52.1	54.2	53.8	53.5	53.1
Output: MEUI [kWh/(m2 * yr)]	50.4	50.4	50.1	50	49.8	49.6	48.7	48.6	48.4	48.3
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5050.0%	5080.0%	5110.0%	5140.0%	5210.0%	5020.0%	5050.0%	5080.0%	5110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6654	6651	6588	6572	6532	6463	6655	6652	6590	6573
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 938.2	$ 937.78	$ 928.96	$ 926.61	$ 920.98	$ 911.23	$ 938.4	$ 937.96	$ 929.16	$ 926.79
Annual savings in carbon tax for electricity [$/year]	$ 3.33	$ 3.33	$ 3.29	$ 3.29	$ 3.27	$ 3.23	$ 3.33	$ 3.33	$ 3.29	$ 3.29
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 941.53	$ 941.1	$ 932.26	$ 929.9	$ 924.25	$ 914.46	$ 941.72	$ 941.29	$ 932.46	$ 930.08
Annual savings in GHG from electricity savings [kg CO2e/year]	73.2	73.2	72.5	72.3	71.8	71.1	73.2	73.2	72.5	72.3
Annual savings in natural gas [m3/year]	127.08	127.08	127.08	127.08	127.08	127.08	128.52	128.52	128.52	128.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,177.39	$ 1,177.39	$ 1,177.39	$ 1,177.39	$ 1,177.39	$ 1,177.39	$ 1,190.78	$ 1,190.78	$ 1,190.78	$ 1,190.78
Annual savings in carbon tax for natural gas [$/year]	$ 293.87	$ 293.87	$ 293.87	$ 293.87	$ 293.87	$ 293.87	$ 297.21	$ 297.21	$ 297.21	$ 297.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,471.26	$ 1,471.26	$ 1,471.26	$ 1,471.26	$ 1,471.26	$ 1,471.26	$ 1,487.99	$ 1,487.99	$ 1,487.99	$ 1,487.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	6530.4	6530.4	6530.4	6530.4	6530.4	6530.4	6604.7	6604.7	6604.7	6604.7
Net Present Value [$]	$ 16,086.32	$ 16,123.32	$ 16,138.35	$ 16,140.11	$ 16,271.91	$ 16,314.63	$ 16,315.07	$ 16,351.7	$ 16,367.1	$ 16,368.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48	$ 10,014.48
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 786.76	$ 331.43	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 550.

MEDIUM 25SAR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,236.57	$ 13,457.18	$ 13,692.04	$ 13,706.73	$ 13,786.57	$ 13,836.57	$ 13,912.65	$ 14,007.18	$ 14,057.18	$ 14,086.57
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,881.33	$ 20,212.68	$ 20,565.44	$ 20,587.51	$ 20,707.43	$ 20,782.53	$ 20,896.8	$ 21,038.78	$ 21,113.88	$ 21,158.03
Net Present Value [$]	$ 15,791.81	$ 15,739.09	$ 15,850.42	$ 17,981.87	$ 15,944.84	$ 13,825.51	$ 15,802.08	$ 15,892.12	$ 13,859.52	$ 15,980.85
Incremental dollars per GHG saving	$ 1.81	$ 1.84	$ 1.88	$ 1.88	$ 1.87	$ 1.76	$ 1.91	$ 1.9	$ 1.79	$ 1.89
Auxiliary Energy Required Heating [GJ/yr]	88	87.2	86.9	90.7	88	88.7	86.2	87.2	88	88
Annual Energy DHW [GJ/yr]	27.1	27.1	27	27	25.3	16.2	27	25.3	16.2	24.1
Annual Energy Space Heating [GJ/yr]	50	49.6	49.4	51.4	50	49.9	49	49.6	49.5	50
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	105.3	104.9	104.7	107.7	103.5	94.2	104.3	103.1	94	102.3
Design Heating Load [W]	14458.5	14344.2	14343.4	14068.5	14458.5	14011.4	14229.1	14344.2	13897.1	14458.5
Annual Energy Electricity [kWh/yr]	21726.7	21620.2	21574.1	22395.7	21726.7	21681.5	21469.4	21620.2	21609	21726.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,011.01	$ 2,995.94	$ 2,989.42	$ 3,105.68	$ 3,011.01	$ 3,004.62	$ 2,974.61	$ 2,995.94	$ 2,994.36	$ 3,011.01
Annual Energy Natural Gas [m3/yr]	726.6	726.7	726.1	726.3	679.2	434.1	726.2	679.3	434.1	647.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.43	$ 313.47	$ 313.21	$ 313.3	$ 292.98	$ 187.26	$ 313.26	$ 293.03	$ 187.26	$ 279.4
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17830	18100	20962	13384	17831	17833	21232	18101	18103	17832
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2131102033	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221102031	Pkg2221101031
GHGI [kg/m2]	6.95	6.95	6.94	6.98	6.57	4.56	6.94	6.56	4.56	6.31
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	104.3	103.4	103	107.5	104.3	105.2	102.1	103.4	104.2	104.3
Output: MEUI [kWh/(m2 * yr)]	94.1	93.6	93.4	96.9	92	81	92.9	91.5	80.7	90.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1300.0%	1370.0%	1400.0%	1030.0%	1300.0%	1230.0%	1470.0%	1370.0%	1300.0%	1300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13648	13542	13496	14317	13648	13603	13391	13542	13530	13648
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,924.38	$ 1,909.37	$ 1,902.87	$ 2,018.71	$ 1,924.38	$ 1,918.01	$ 1,888.1	$ 1,909.37	$ 1,907.79	$ 1,924.38
Annual savings in carbon tax for electricity [$/year]	$ 6.82	$ 6.77	$ 6.75	$ 7.16	$ 6.82	$ 6.8	$ 6.7	$ 6.77	$ 6.77	$ 6.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,931.21	$ 1,916.14	$ 1,909.61	$ 2,025.87	$ 1,931.21	$ 1,924.81	$ 1,894.8	$ 1,916.14	$ 1,914.55	$ 1,931.21
Annual savings in GHG from electricity savings [kg CO2e/year]	150.1	149	148.5	157.5	150.1	149.6	147.3	149	148.8	150.1
Annual savings in natural gas [m3/year]	144.93	144.92	144.94	144.94	146.69	155.82	144.94	146.69	155.82	147.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,342.74	$ 1,342.71	$ 1,342.91	$ 1,342.84	$ 1,359.1	$ 1,443.71	$ 1,342.88	$ 1,359.07	$ 1,443.71	$ 1,369.98
Annual savings in carbon tax for natural gas [$/year]	$ 335.14	$ 335.13	$ 335.18	$ 335.17	$ 339.23	$ 360.34	$ 335.18	$ 339.22	$ 360.34	$ 341.94
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,677.88	$ 1,677.84	$ 1,678.1	$ 1,678.01	$ 1,698.33	$ 1,804.06	$ 1,678.05	$ 1,698.28	$ 1,804.06	$ 1,711.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	7447.6	7447.4	7448.5	7448.2	7538.3	8007.6	7448.4	7538.2	8007.6	7598.7
Net Present Value [$]	$ 15,791.81	$ 15,739.09	$ 15,850.42	$ 17,981.87	$ 15,944.84	$ 13,825.51	$ 15,802.08	$ 15,892.12	$ 13,859.52	$ 15,980.85
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 4,318.3	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.

MEDIUM 25SAR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,836.57	$ 14,057.18	$ 14,386.57	$ 13,236.57	$ 14,292.04	$ 14,686.57	$ 14,607.18	$ 13,457.18	$ 14,512.65	$ 14,907.18
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,782.53	$ 21,113.88	$ 21,608.63	$ 19,881.33	$ 21,466.64	$ 22,059.23	$ 21,939.98	$ 20,212.68	$ 21,798.	$ 22,390.58
Net Present Value [$]	$ 13,825.51	$ 13,859.52	$ 14,041.04	$ 15,791.81	$ 13,962.55	$ 14,118.78	$ 14,007.67	$ 15,739.09	$ 13,925.9	$ 14,085.23
Incremental dollars per GHG saving	$ 1.76	$ 1.79	$ 1.81	$ 1.81	$ 1.82	$ 1.84	$ 1.84	$ 1.84	$ 1.85	$ 1.87
Auxiliary Energy Required Heating [GJ/yr]	88.7	88	88.8	88	87.6	88.8	88	87.2	86.9	88
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	27.1	16.2	13.7	14.7	27.1	16.2	13.7
Annual Energy Space Heating [GJ/yr]	49.9	49.5	49.9	50	49.4	49.9	49.5	49.6	49	49.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	94.2	94	92.7	105.3	93.8	91.7	92.4	104.9	93.4	91.4
Design Heating Load [W]	14011.4	13897.1	14011.4	14458.5	13896.3	14011.4	13897.1	14344.2	13782	13897.1
Annual Energy Electricity [kWh/yr]	21681.5	21609	21683.1	21726.7	21557.8	21684.2	21584.4	21620.2	21457.9	21585.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,004.62	$ 2,994.36	$ 3,004.84	$ 3,011.01	$ 2,987.11	$ 3,005.	$ 2,990.88	$ 2,995.94	$ 2,972.98	$ 2,991.03
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	726.6	434.1	366.8	393.7	726.7	434.1	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 313.43	$ 187.26	$ 158.22	$ 169.83	$ 313.47	$ 187.26	$ 158.22
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	18103	17834	17830	20965	17835	18104	18100	21235	18105
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2231102031	Pkg2221102031
GHGI [kg/m2]	4.56	4.56	4.23	6.95	4.56	4.01	4.23	6.95	4.55	4.01
% ICC	2.6%	2.7%	2.8%	2.5%	2.7%	2.8%	2.8%	2.6%	2.8%	2.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	105.2	104.2	105.2	104.3	103.9	105.2	104.2	103.4	102.9	104.3
Output: MEUI [kWh/(m2 * yr)]	81	80.7	79.2	94.1	80.4	78	78.8	93.6	80	77.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1230.0%	1300.0%	1220.0%	1300.0%	1340.0%	1220.0%	1300.0%	1370.0%	1400.0%	1300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13603	13530	13604	13648	13479	13606	13506	13542	13379	13507
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,918.01	$ 1,907.79	$ 1,918.23	$ 1,924.38	$ 1,900.57	$ 1,918.39	$ 1,904.32	$ 1,909.37	$ 1,886.48	$ 1,904.47
Annual savings in carbon tax for electricity [$/year]	$ 6.8	$ 6.77	$ 6.8	$ 6.82	$ 6.74	$ 6.8	$ 6.75	$ 6.77	$ 6.69	$ 6.75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,924.81	$ 1,914.55	$ 1,925.04	$ 1,931.21	$ 1,907.31	$ 1,925.19	$ 1,911.07	$ 1,916.14	$ 1,893.17	$ 1,911.23
Annual savings in GHG from electricity savings [kg CO2e/year]	149.6	148.8	149.6	150.1	148.3	149.7	148.6	149	147.2	148.6
Annual savings in natural gas [m3/year]	155.82	155.82	157.33	144.93	155.82	158.33	157.33	144.92	155.82	158.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,443.71	$ 1,443.71	$ 1,457.66	$ 1,342.74	$ 1,443.71	$ 1,466.94	$ 1,457.66	$ 1,342.71	$ 1,443.71	$ 1,466.94
Annual savings in carbon tax for natural gas [$/year]	$ 360.34	$ 360.34	$ 363.82	$ 335.14	$ 360.34	$ 366.14	$ 363.82	$ 335.13	$ 360.34	$ 366.14
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,804.06	$ 1,804.06	$ 1,821.48	$ 1,677.88	$ 1,804.06	$ 1,833.09	$ 1,821.48	$ 1,677.84	$ 1,804.06	$ 1,833.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	8007.6	8007.6	8085	7447.6	8007.6	8136.5	8085	7447.4	8007.6	8136.5
Net Present Value [$]	$ 13,825.51	$ 13,859.52	$ 14,041.04	$ 15,791.81	$ 13,962.55	$ 14,118.78	$ 14,007.67	$ 15,739.09	$ 13,925.9	$ 14,085.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	10.51	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff	BC R-30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 850.

MEDIUM 25SAR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,781.15	$ 16,001.76	$ 16,281.15	$ 16,236.62	$ 16,501.76	$ 16,331.15	$ 16,457.23	$ 16,551.76	$ 16,631.15	$ 16,851.76
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,703.29	$ 24,034.64	$ 24,454.29	$ 24,387.4	$ 24,785.64	$ 24,529.39	$ 24,718.76	$ 24,860.74	$ 24,979.99	$ 25,311.34
Net Present Value [$]	$ 2,084.94	$ 2,057.63	$ 1,902.02	$ 1,897.89	$ 1,874.1	$ 1,871.55	$ 1,869.61	$ 1,843.09	$ 1,794.3	$ 1,766.81
Incremental dollars per GHG saving	$ 3.92	$ 3.93	$ 3.97	$ 3.97	$ 3.99	$ 3.98	$ 3.99	$ 3.99	$ 4.	$ 4.01
Auxiliary Energy Required Heating [GJ/yr]	74.4	73.6	73.1	73.3	72.3	74.4	72.5	73.6	74.4	73.6
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	14.7	16.2	14.7	13.7	13.7
Annual Energy Space Heating [GJ/yr]	78.8	78	77.4	77.7	76.6	78.8	76.8	78	78.8	78
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	122.3	121.5	120.9	121.1	120.1	120.8	120.3	120	119.8	119
Design Heating Load [W]	11454.9	11340.6	11406.8	11339.8	11292.5	11454.9	11225.5	11340.6	11454.9	11340.6
Annual Energy Electricity [kWh/yr]	7984.7	7980.6	7978	7979	7973.8	7984.8	7974.9	7980.7	7984.8	7980.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,066.52	$ 1,065.94	$ 1,065.57	$ 1,065.71	$ 1,064.98	$ 1,066.53	$ 1,065.13	$ 1,065.95	$ 1,066.53	$ 1,065.95
Annual Energy Natural Gas [m3/yr]	2512.2	2490.4	2476.4	2481.9	2454.7	2472	2460.2	2450.3	2445.4	2423.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,083.68	$ 1,074.27	$ 1,068.23	$ 1,070.61	$ 1,058.87	$ 1,066.33	$ 1,061.24	$ 1,056.97	$ 1,054.86	$ 1,045.46
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43438	43654	43456	45382	43672	43439	45598	43655	43440	43656
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3321201034	Pkg3331201033	Pkg3321202034	Pkg3321201033	Pkg3331202033	Pkg3321202033	Pkg3321201033	Pkg3321202033
GHGI [kg/m2]	20.9	20.72	20.6	20.65	20.43	20.57	20.47	20.39	20.35	20.17
% ICC	3.0%	3.1%	3.1%	3.1%	3.2%	3.1%	3.1%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	88.2	87.2	86.6	86.9	85.7	88.2	86	87.3	88.2	87.3
Output: MEUI [kWh/(m2 * yr)]	114.6	113.6	113	113.2	112	112.8	112.2	111.8	111.6	110.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2640.0%	2720.0%	2770.0%	2750.0%	2850.0%	2640.0%	2830.0%	2720.0%	2640.0%	2720.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	94	98	101	100	105	94	104	98	94	98
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 13.24	$ 13.82	$ 14.18	$ 14.04	$ 14.78	$ 13.23	$ 14.62	$ 13.8	$ 13.23	$ 13.8
Annual savings in carbon tax for electricity [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 13.29	$ 13.87	$ 14.23	$ 14.09	$ 14.83	$ 13.27	$ 14.67	$ 13.85	$ 13.27	$ 13.85
Annual savings in GHG from electricity savings [kg CO2e/year]	1	1.1	1.1	1.1	1.2	1	1.1	1.1	1	1.1
Annual savings in natural gas [m3/year]	78.4	79.21	79.73	79.53	80.54	79.89	80.33	80.7	80.89	81.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 726.34	$ 733.87	$ 738.7	$ 736.8	$ 746.19	$ 740.22	$ 744.29	$ 747.71	$ 749.4	$ 756.93
Annual savings in carbon tax for natural gas [$/year]	$ 181.29	$ 183.17	$ 184.38	$ 183.9	$ 186.25	$ 184.76	$ 185.77	$ 186.63	$ 187.05	$ 188.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 907.64	$ 917.04	$ 923.08	$ 920.71	$ 932.44	$ 924.98	$ 930.07	$ 934.34	$ 936.45	$ 945.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	4028.7	4070.4	4097.3	4086.7	4138.8	4105.7	4128.3	4147.2	4156.6	4198.4
Net Present Value [$]	$ 2,084.94	$ 2,057.63	$ 1,902.02	$ 1,897.89	$ 1,874.1	$ 1,871.55	$ 1,869.61	$ 1,843.09	$ 1,794.3	$ 1,766.81
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.

MEDIUM 25SAR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 16,993.87	$ 17,214.48	$ 17,229.95	$ 17,449.34	$ 17,454.93	$ 17,493.87	$ 17,543.87	$ 17,559.34	$ 17,593.87	$ 17,611.76
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,524.79	$ 25,856.15	$ 25,879.38	$ 26,208.91	$ 26,217.3	$ 26,275.79	$ 26,350.89	$ 26,374.13	$ 26,425.99	$ 26,452.86
Net Present Value [$]	$ 16,912.7	$ 16,868.19	$ 17,355.11	$ 16,984.26	$ 17,373.76	$ 17,058.77	$ 17,065.73	$ 17,618.32	$ 15,043.78	$ 17,717.42
Incremental dollars per GHG saving	$ 2.33	$ 2.36	$ 2.36	$ 2.39	$ 2.39	$ 2.39	$ 2.37	$ 2.37	$ 2.24	$ 2.41
Auxiliary Energy Required Heating [GJ/yr]	79.4	78.7	80	78.4	79.4	78.2	79.4	80.8	80.2	79.2
Annual Energy DHW [GJ/yr]	27.1	27.1	27.1	27.1	27.1	27.1	25.3	25.3	16.2	27.1
Annual Energy Space Heating [GJ/yr]	45.2	44.8	45.5	44.7	45.2	44.7	45.2	46	45.3	45.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	101.6	101.2	101.9	101	101.6	101.1	99.8	100.6	90.7	101.9
Design Heating Load [W]	12631	12516.7	12626.1	12515.9	12631	12582.9	12631	12740.4	12201.3	12812.1
Annual Energy Electricity [kWh/yr]	20701.3	20598	20783.4	20553.5	20701.3	20562.5	20701.3	20912.3	20695.3	20772.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,865.92	$ 2,851.3	$ 2,877.54	$ 2,845.01	$ 2,865.92	$ 2,846.28	$ 2,865.92	$ 2,895.78	$ 2,865.07	$ 2,876.05
Annual Energy Natural Gas [m3/yr]	727	727.1	726.4	726.6	727	727.4	679.6	678.9	434.1	727.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.6	$ 313.65	$ 313.34	$ 313.43	$ 313.6	$ 313.78	$ 293.16	$ 292.85	$ 187.26	$ 313.73
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35668	35884	37810	37612	36316	35686	35669	37595	35671	28090
Upgrade Package List	Pkg3221201033	Pkg3221202033	Pkg3231202032	Pkg3231201033	Pkg3231301033	Pkg3221201034	Pkg3221201033	Pkg3231201032	Pkg3221201033	Pkg2321202032
GHGI [kg/m2]	6.91	6.91	6.91	6.9	6.91	6.91	6.52	6.53	4.52	6.92
% ICC	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	94.1	93.2	94.8	92.9	94.1	92.6	94.1	95.8	95.1	93.9
Output: MEUI [kWh/(m2 * yr)]	89.7	89.3	90	89.1	89.7	89.1	87.6	88.5	76.8	90
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2150.0%	2220.0%	2090.0%	2250.0%	2150.0%	2270.0%	2150.0%	2010.0%	2070.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12623	12519	12705	12475	12623	12484	12623	12834	12617	12694
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,779.8	$ 1,765.24	$ 1,791.38	$ 1,758.96	$ 1,779.8	$ 1,760.23	$ 1,779.8	$ 1,809.55	$ 1,778.95	$ 1,789.9
Annual savings in carbon tax for electricity [$/year]	$ 6.31	$ 6.26	$ 6.35	$ 6.24	$ 6.31	$ 6.24	$ 6.31	$ 6.42	$ 6.31	$ 6.35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,786.11	$ 1,771.5	$ 1,797.73	$ 1,765.2	$ 1,786.11	$ 1,766.47	$ 1,786.11	$ 1,815.97	$ 1,785.26	$ 1,796.24
Annual savings in GHG from electricity savings [kg CO2e/year]	138.8	137.7	139.8	137.2	138.8	137.3	138.8	141.2	138.8	139.6
Annual savings in natural gas [m3/year]	144.91	144.91	144.93	144.93	144.91	144.9	146.68	146.7	155.82	144.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,342.6	$ 1,342.57	$ 1,342.81	$ 1,342.74	$ 1,342.6	$ 1,342.46	$ 1,358.96	$ 1,359.21	$ 1,443.71	$ 1,342.5
Annual savings in carbon tax for natural gas [$/year]	$ 335.11	$ 335.1	$ 335.16	$ 335.14	$ 335.11	$ 335.07	$ 339.19	$ 339.25	$ 360.34	$ 335.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,677.71	$ 1,677.67	$ 1,677.97	$ 1,677.88	$ 1,677.71	$ 1,677.54	$ 1,698.16	$ 1,698.46	$ 1,804.06	$ 1,677.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	7446.8	7446.6	7448	7447.6	7446.8	7446.1	7537.6	7538.9	8007.6	7446.2
Net Present Value [$]	$ 16,912.7	$ 16,868.19	$ 17,355.11	$ 16,984.26	$ 17,373.76	$ 17,058.77	$ 17,065.73	$ 17,618.32	$ 15,043.78	$ 17,717.42
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	8.78	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.

MEDIUM 25SAR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 17,593.87	$ 17,814.48	$ 17,829.95	$ 19,705.15	$ 18,143.87	$ 17,991.15	$ 18,010.87	$ 18,049.34	$ 18,054.93	$ 19,925.76
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 26,425.99	$ 26,757.35	$ 26,780.58	$ 29,597.14	$ 27,252.09	$ 27,022.71	$ 27,052.33	$ 27,110.11	$ 27,118.5	$ 29,928.49
Net Present Value [$]	$ 15,043.78	$ 14,984.31	$ 15,500.61	$ 20,050.99	$ 15,259.67	$ 15,823.94	$ 15,730.64	$ 15,100.49	$ 15,504.84	$ 20,015.43
Incremental dollars per GHG saving	$ 2.24	$ 2.26	$ 2.27	$ 2.27	$ 2.28	$ 2.29	$ 2.29	$ 2.29	$ 2.29	$ 2.3
Auxiliary Energy Required Heating [GJ/yr]	80.2	79.4	80.8	79.9	80.2	80.6	80.9	79.1	80.2	79.1
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	9.3	14.7	16.2	16.2	16.2	16.2	9.3
Annual Energy Space Heating [GJ/yr]	45.3	44.9	45.6	45	45.3	45.7	45.7	44.7	45.3	44.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	90.7	90.3	91	83.6	89.2	91.2	91	90.1	90.7	83.3
Design Heating Load [W]	12201.3	12087	12196.4	11980.8	12201.3	12479.3	12244.3	12086.2	12201.3	11866.5
Annual Energy Electricity [kWh/yr]	20695.3	20586.5	20781	23232.5	20697	20844	20800.1	20540.4	20695.3	23133
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,865.07	$ 2,849.67	$ 2,877.2	$ 3,224.08	$ 2,865.31	$ 2,886.11	$ 2,879.9	$ 2,843.15	$ 2,865.07	$ 3,210.
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	0	393.7	434.1	434.1	434.1	434.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$.	$ 169.83	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35671	35887	37813	43450	35672	27877	36085	37615	36319	43666
Upgrade Package List	Pkg3221201033	Pkg3221202033	Pkg3231202032	Pkg3321201033	Pkg3221201033	Pkg2321201032	Pkg3221203032	Pkg3231201033	Pkg3221301033	Pkg3321202033
GHGI [kg/m2]	4.52	4.51	4.52	1.09	4.19	4.52	4.52	4.51	4.52	1.09
% ICC	3.4%	3.4%	3.4%	3.8%	3.5%	3.4%	3.4%	3.5%	3.5%	3.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	95.1	94.1	95.8	94.6	95.1	95.6	95.9	93.8	95.1	93.7
Output: MEUI [kWh/(m2 * yr)]	76.8	76.3	77.1	68.4	75	77.4	77.2	76.1	76.8	68
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2070.0%	2150.0%	2010.0%	2100.0%	2070.0%	2030.0%	2000.0%	2180.0%	2070.0%	2180.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12617	12508	12702	15154	12618	12765	12722	12462	12617	15054
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,778.95	$ 1,763.61	$ 1,791.04	$ 2,136.7	$ 1,779.19	$ 1,799.92	$ 1,793.73	$ 1,757.11	$ 1,778.95	$ 2,122.67
Annual savings in carbon tax for electricity [$/year]	$ 6.31	$ 6.25	$ 6.35	$ 7.58	$ 6.31	$ 6.38	$ 6.36	$ 6.23	$ 6.31	$ 7.53
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,785.26	$ 1,769.87	$ 1,797.39	$ 2,144.28	$ 1,785.5	$ 1,806.3	$ 1,800.09	$ 1,763.34	$ 1,785.26	$ 2,130.2
Annual savings in GHG from electricity savings [kg CO2e/year]	138.8	137.6	139.7	166.7	138.8	140.4	139.9	137.1	138.8	165.6
Annual savings in natural gas [m3/year]	155.82	155.82	155.82	172	157.33	155.82	155.82	155.82	155.82	172
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,593.56	$ 1,457.66	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,593.56
Annual savings in carbon tax for natural gas [$/year]	$ 360.34	$ 360.34	$ 360.34	$ 397.75	$ 363.82	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 397.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,991.31	$ 1,821.48	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,991.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	8007.6	8007.6	8007.6	8838.8	8085	8007.6	8007.6	8007.6	8007.6	8838.8
Net Present Value [$]	$ 15,043.78	$ 14,984.31	$ 15,500.61	$ 20,050.99	$ 15,259.67	$ 15,823.94	$ 15,730.64	$ 15,100.49	$ 15,504.84	$ 20,015.43

ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	14.09	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR80	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 1,162.47	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	7.04	5.28	7.04	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

MEDIUM 25SAR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,151.76	$ 19,607.23	$ 18,931.15	$ 20,612.82	$ 19,386.62	$ 21,068.29	$ 19,651.76	$ 20,107.23	$ 19,431.15	$ 21,112.82
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 28,765.94	$ 29,450.06	$ 28,434.59	$ 30,960.46	$ 29,118.7	$ 31,644.57	$ 29,516.94	$ 30,201.06	$ 29,185.59	$ 31,711.46
Net Present Value [$]	$ 14,151.38	$ 14,170.29	$ 14,195.52	$ 14,227.9	$ 14,273.22	$ 14,287.53	$ 14,288.59	$ 14,304.94	$ 14,334.55	$ 14,352.32
Incremental dollars per GHG saving	$ 2.43	$ 2.49	$ 2.4	$ 2.61	$ 2.46	$ 2.67	$ 2.49	$ 2.55	$ 2.47	$ 2.68
Auxiliary Energy Required Heating [GJ/yr]	73.3	72.3	74.1	70.1	73	69.1	72	71	72.8	68.8
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
Annual Energy Space Heating [GJ/yr]	41.7	41.1	42	39.7	41.5	39.2	41.2	40.6	41.5	39.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	87.2	86.6	87.6	85.3	87.1	84.8	86.7	86.1	87.1	84.8
Design Heating Load [W]	11436.9	11321.8	11551.1	10875.5	11436	10760.5	11388.7	11273.7	11503	10827.4
Annual Energy Electricity [kWh/yr]	19743.5	19573.9	19846.3	19205.7	19699.6	19051.9	19602.6	19432	19706.1	19059.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,730.39	$ 2,706.39	$ 2,744.94	$ 2,654.29	$ 2,724.18	$ 2,632.53	$ 2,710.45	$ 2,686.31	$ 2,725.1	$ 2,633.65
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43663	45607	43447	50989	45391	51565	43681	45625	43465	51007
Upgrade Package List	Pkg3321202033	Pkg3331202033	Pkg3321201033	Pkg4321302033	Pkg3331201033	Pkg4331302033	Pkg3321202034	Pkg3331202034	Pkg3321201034	Pkg4321302034
GHGI [kg/m2]	4.47	4.46	4.48	4.45	4.47	4.44	4.47	4.46	4.47	4.44
% ICC	3.7%	3.8%	3.6%	3.9%	3.7%	4.0%	3.8%	3.8%	3.7%	4.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	86.9	85.6	87.8	83.1	86.6	81.8	85.4	84.1	86.3	81.6
Output: MEUI [kWh/(m2 * yr)]	72.7	71.9	73.1	70.4	72.5	69.7	72.1	71.3	72.5	69.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2750.0%	2850.0%	2670.0%	3070.0%	2780.0%	3170.0%	2880.0%	2980.0%	2800.0%	3190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11665	11495	11768	11127	11621	10973	11524	11353	11628	10981
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,644.75	$ 1,620.84	$ 1,659.25	$ 1,568.92	$ 1,638.56	$ 1,547.24	$ 1,624.88	$ 1,600.83	$ 1,639.48	$ 1,548.35
Annual savings in carbon tax for electricity [$/year]	$ 5.83	$ 5.75	$ 5.88	$ 5.56	$ 5.81	$ 5.49	$ 5.76	$ 5.68	$ 5.81	$ 5.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,650.58	$ 1,626.58	$ 1,665.13	$ 1,574.48	$ 1,644.37	$ 1,552.72	$ 1,630.65	$ 1,606.51	$ 1,645.29	$ 1,553.84
Annual savings in GHG from electricity savings [kg CO2e/year]	128.3	126.4	129.4	122.4	127.8	120.7	126.8	124.9	127.9	120.8
Annual savings in natural gas [m3/year]	155.82	155.82	155.82	155.82	155.82	155.82	155.82	155.82	155.82	155.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71	$ 1,443.71
Annual savings in carbon tax for natural gas [$/year]	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34	$ 360.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06	$ 1,804.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	8007.6	8007.6	8007.6	8007.6	8007.6	8007.6	8007.6	8007.6	8007.6	8007.6
Net Present Value [$]	$ 14,151.38	$ 14,170.29	$ 14,195.52	$ 14,227.9	$ 14,273.22	$ 14,287.53	$ 14,288.59	$ 14,304.94	$ 14,334.55	$ 14,352.32
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	8.78	10.51	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 25SAR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,236.57	$ 13,457.18	$ 13,692.04	$ 13,786.57	$ 13,836.57	$ 13,912.65	$ 14,007.18	$ 14,057.18	$ 14,086.57	$ 14,242.04
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,881.33	$ 20,212.68	$ 20,565.44	$ 20,707.43	$ 20,782.53	$ 20,896.8	$ 21,038.78	$ 21,113.88	$ 21,158.03	$ 21,391.54
Net Present Value [$]	$ 22,553.77	$ 22,445.18	$ 22,500.75	$ 22,693.21	$ 20,317.6	$ 22,357.47	$ 22,584.62	$ 20,218.69	$ 22,719.26	$ 22,640.44
Incremental dollars per GHG saving	$ 1.56	$ 1.59	$ 1.62	$ 1.61	$ 1.53	$ 1.64	$ 1.64	$ 1.56	$ 1.63	$ 1.66
Auxiliary Energy Required Heating [GJ/yr]	104.2	103.3	103	104.2	104.5	102.1	103.3	103.7	104.2	103
Annual Energy DHW [GJ/yr]	27.5	27.5	27.4	25.6	16.5	27.4	25.6	16.5	24.4	25.6
Annual Energy Space Heating [GJ/yr]	68.1	67.6	67.4	68.1	67.7	66.9	67.6	67.2	68.1	67.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	123.1	122.6	122.3	121.2	111.6	121.8	120.8	111.1	120	120.5
Design Heating Load [W]	15213.3	15093.4	15096.4	15213.3	14725.5	14976.5	15093.4	14605.6	15213.3	15096.4
Annual Energy Electricity [kWh/yr]	26561.1	26433	26365.3	26561.1	26418	26224	26433	26293.9	26561.1	26365.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,695.08	$ 3,676.95	$ 3,667.37	$ 3,695.08	$ 3,674.83	$ 3,647.38	$ 3,676.95	$ 3,657.27	$ 3,695.08	$ 3,667.37
Annual Energy Natural Gas [m3/yr]	737.2	737.3	736.7	688.2	442.6	736.7	688.3	442.6	655.5	687.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.	$ 318.05	$ 317.79	$ 296.87	$ 190.92	$ 317.79	$ 296.91	$ 190.92	$ 282.76	$ 296.65
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17830	18100	20962	17831	17833	21232	18101	18103	17832	20963
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2231101031
GHGI [kg/m2]	7.27	7.26	7.26	6.87	4.86	7.25	6.86	4.85	6.6	6.85
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	123.5	122.5	122.1	123.5	123.9	121.1	122.5	122.9	123.5	122.1
Output: MEUI [kWh/(m2 * yr)]	115.3	114.7	114.4	113.1	101.7	113.8	112.6	101.1	111.7	112.3
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1060.0%	1140.0%	1170.0%	1060.0%	1040.0%	1240.0%	1140.0%	1110.0%	1060.0%	1170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18357	18229	18161	18357	18214	18020	18229	18090	18357	18161
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,588.37	$ 2,570.3	$ 2,560.76	$ 2,588.37	$ 2,568.19	$ 2,540.83	$ 2,570.3	$ 2,550.69	$ 2,588.37	$ 2,560.76
Annual savings in carbon tax for electricity [$/year]	$ 9.18	$ 9.11	$ 9.08	$ 9.18	$ 9.11	$ 9.01	$ 9.11	$ 9.04	$ 9.18	$ 9.08
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,597.54	$ 2,579.42	$ 2,569.84	$ 2,597.54	$ 2,577.3	$ 2,549.84	$ 2,579.42	$ 2,559.73	$ 2,597.54	$ 2,569.84
Annual savings in GHG from electricity savings [kg CO2e/year]	201.9	200.5	199.8	201.9	200.4	198.2	200.5	199	201.9	199.8
Annual savings in natural gas [m3/year]	168.78	168.77	168.79	170.6	179.75	168.79	170.6	179.75	171.82	170.62
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,563.7	$ 1,563.67	$ 1,563.88	$ 1,580.62	$ 1,665.4	$ 1,563.88	$ 1,580.59	$ 1,665.4	$ 1,591.91	$ 1,580.79
Annual savings in carbon tax for natural gas [$/year]	$ 390.29	$ 390.28	$ 390.34	$ 394.52	$ 415.68	$ 390.34	$ 394.51	$ 415.68	$ 397.33	$ 394.56
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,954.	$ 1,953.95	$ 1,954.21	$ 1,975.13	$ 2,081.08	$ 1,954.21	$ 1,975.09	$ 2,081.08	$ 1,989.24	$ 1,975.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	8673.2	8673	8674.1	8767	9237.3	8674.1	8766.8	9237.3	8829.6	8768
Net Present Value [$]	$ 22,553.77	$ 22,445.18	$ 22,500.75	$ 22,693.21	$ 20,317.6	$ 22,357.47	$ 22,584.62	$ 20,218.69	$ 22,719.26	$ 22,640.44
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 25SAR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,836.57	$ 14,057.18	$ 13,236.57	$ 14,386.57	$ 14,292.04	$ 13,457.18	$ 14,607.18	$ 14,686.57	$ 14,512.65	$ 13,786.57
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,782.53	$ 21,113.88	$ 19,881.33	$ 21,608.63	$ 21,466.64	$ 20,212.68	$ 21,939.98	$ 22,059.23	$ 21,798.	$ 20,707.43
Net Present Value [$]	$ 20,317.6	$ 20,218.69	$ 22,553.77	$ 20,521.61	$ 20,349.48	$ 22,445.18	$ 20,422.69	$ 20,592.19	$ 20,185.56	$ 22,693.21
Incremental dollars per GHG saving	$ 1.53	$ 1.56	$ 1.56	$ 1.58	$ 1.58	$ 1.59	$ 1.6	$ 1.6	$ 1.61	$ 1.61
Auxiliary Energy Required Heating [GJ/yr]	104.5	103.7	104.2	104.6	103.3	103.3	103.7	104.6	102.5	104.2
Annual Energy DHW [GJ/yr]	16.5	16.5	27.5	14.9	16.5	27.5	14.9	13.9	16.5	25.6
Annual Energy Space Heating [GJ/yr]	67.7	67.2	68.1	67.7	67	67.6	67.2	67.7	66.4	68.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	111.6	111.1	123.1	110	111	122.6	109.6	109	110.5	121.2
Design Heating Load [W]	14725.5	14605.6	15213.3	14725.5	14608.6	15093.4	14605.6	14725.5	14488.7	15213.3
Annual Energy Electricity [kWh/yr]	26418	26293.9	26561.1	26420	26253.5	26433	26295.9	26421.3	26104.1	26561.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,674.83	$ 3,657.27	$ 3,695.08	$ 3,675.12	$ 3,651.56	$ 3,676.95	$ 3,657.55	$ 3,675.3	$ 3,630.42	$ 3,695.08
Annual Energy Natural Gas [m3/yr]	442.6	442.6	737.2	400.7	442.6	737.3	400.7	372.9	442.6	688.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 318.	$ 172.85	$ 190.92	$ 318.05	$ 172.85	$ 160.86	$ 190.92	$ 296.87
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	18103	17830	17834	20965	18100	18104	17835	21235	17831
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2221101031
GHGI [kg/m2]	4.86	4.85	7.27	4.51	4.85	7.26	4.51	4.29	4.84	6.87
% ICC	2.6%	2.7%	2.5%	2.8%	2.7%	2.6%	2.8%	2.8%	2.8%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	123.9	122.9	123.5	123.9	122.5	122.5	122.9	123.9	121.5	123.5
Output: MEUI [kWh/(m2 * yr)]	101.7	101.1	115.3	99.8	101	114.7	99.3	98.6	100.3	113.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1040.0%	1110.0%	1060.0%	1030.0%	1140.0%	1140.0%	1110.0%	1030.0%	1210.0%	1060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18214	18090	18357	18216	18050	18229	18092	18217	17900	18357
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,568.19	$ 2,550.69	$ 2,588.37	$ 2,568.47	$ 2,544.99	$ 2,570.3	$ 2,550.97	$ 2,568.65	$ 2,523.93	$ 2,588.37
Annual savings in carbon tax for electricity [$/year]	$ 9.11	$ 9.04	$ 9.18	$ 9.11	$ 9.02	$ 9.11	$ 9.05	$ 9.11	$ 8.95	$ 9.18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,577.3	$ 2,559.73	$ 2,597.54	$ 2,577.58	$ 2,554.02	$ 2,579.42	$ 2,560.02	$ 2,577.76	$ 2,532.88	$ 2,597.54
Annual savings in GHG from electricity savings [kg CO2e/year]	200.4	199	201.9	200.4	198.5	200.5	199	200.4	196.9	201.9
Annual savings in natural gas [m3/year]	179.75	179.75	168.78	181.31	179.75	168.77	181.31	182.35	179.75	170.6
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,665.4	$ 1,665.4	$ 1,563.7	$ 1,679.87	$ 1,665.4	$ 1,563.67	$ 1,679.87	$ 1,689.46	$ 1,665.4	$ 1,580.62
Annual savings in carbon tax for natural gas [$/year]	$ 415.68	$ 415.68	$ 390.29	$ 419.29	$ 415.68	$ 390.28	$ 419.29	$ 421.68	$ 415.68	$ 394.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,081.08	$ 2,081.08	$ 1,954.	$ 2,099.15	$ 2,081.08	$ 1,953.95	$ 2,099.15	$ 2,111.14	$ 2,081.08	$ 1,975.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	9237.3	9237.3	8673.2	9317.5	9237.3	8673	9317.5	9370.7	9237.3	8767
Net Present Value [$]	$ 20,317.6	$ 20,218.69	$ 22,553.77	$ 20,521.61	$ 20,349.48	$ 22,445.18	$ 20,422.69	$ 20,592.19	$ 20,185.56	$ 22,693.21
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 25SAR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,457.23	$ 16,501.76	$ 16,551.76	$ 16,631.15	$ 16,851.76	$ 16,786.62	$ 16,736.62	$ 16,638.15	$ 17,007.23	$ 16,957.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,718.76	$ 24,785.64	$ 24,860.74	$ 24,979.99	$ 25,311.34	$ 25,213.5	$ 25,138.4	$ 24,990.5	$ 25,544.86	$ 25,469.76
Net Present Value [$]	$ 4,191.51	$ 4,149.77	$ 4,147.52	$ 4,089.38	$ 4,078.58	$ 3,999.6	$ 3,998.88	$ 3,988.2	$ 3,988.07	$ 3,987.53
Incremental dollars per GHG saving	$ 3.56	$ 3.56	$ 3.56	$ 3.58	$ 3.59	$ 3.6	$ 3.6	$ 3.6	$ 3.61	$ 3.61
Auxiliary Energy Required Heating [GJ/yr]	86.2	86.2	87.4	88.3	87.4	87	85.8	86.3	86.2	85
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	13.9	13.9	14.9	16.5	16.5	14.9	16.5
Annual Energy Space Heating [GJ/yr]	91.3	91.3	92.6	93.5	92.6	92.2	90.9	91.4	91.3	90
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	135.1	135.1	134.8	134.7	133.8	134.5	134.7	135.2	133.6	133.8
Design Heating Load [W]	11777.7	11844.2	11894.6	12014.5	11894.6	11897.6	11847.1	11824.1	11777.7	11727.2
Annual Energy Electricity [kWh/yr]	8047.2	8047.1	8053.6	8058.1	8053.7	8051.7	8045.4	8047.7	8047.3	8040.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,075.36	$ 1,075.35	$ 1,076.27	$ 1,076.91	$ 1,076.28	$ 1,076.	$ 1,075.11	$ 1,075.43	$ 1,075.38	$ 1,074.47
Annual Energy Natural Gas [m3/yr]	2850	2849.7	2842	2838.1	2814.4	2832.2	2840.2	2852.5	2808.6	2816.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,229.39	$ 1,229.26	$ 1,225.94	$ 1,224.26	$ 1,214.03	$ 1,221.71	$ 1,225.16	$ 1,230.47	$ 1,211.53	$ 1,214.98
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	45598	43672	43655	43440	43656	45383	45400	43870	45599	45616
Upgrade Package List	Pkg3331202033	Pkg3321202034	Pkg3321202033	Pkg3321201033	Pkg3321202033	Pkg3331201033	Pkg3331201034	Pkg3321203033	Pkg3331202033	Pkg3331202034
GHGI [kg/m2]	23.66	23.66	23.59	23.56	23.37	23.51	23.58	23.68	23.32	23.38
% ICC	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	102.1	102.1	103.6	104.6	103.6	103.2	101.7	102.2	102.2	100.7
Output: MEUI [kWh/(m2 * yr)]	129.7	129.7	129.4	129.3	128.2	129	129.3	129.9	127.9	128.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2610.0%	2610.0%	2500.0%	2430.0%	2500.0%	2540.0%	2640.0%	2600.0%	2610.0%	2710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	157	157	150	146	150	152	158	156	157	163
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 22.09	$ 22.11	$ 21.19	$ 20.56	$ 21.18	$ 21.46	$ 22.35	$ 22.02	$ 22.08	$ 22.98
Annual savings in carbon tax for electricity [$/year]	$ .08	$ .08	$ .08	$ .07	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 22.17	$ 22.19	$ 21.27	$ 20.63	$ 21.25	$ 21.54	$ 22.43	$ 22.1	$ 22.16	$ 23.06
Annual savings in GHG from electricity savings [kg CO2e/year]	1.7	1.7	1.7	1.6	1.7	1.7	1.7	1.7	1.7	1.8
Annual savings in natural gas [m3/year]	90.05	90.07	90.35	90.5	91.38	90.72	90.42	89.96	91.6	91.3
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 834.36	$ 834.46	$ 837.12	$ 838.47	$ 846.65	$ 840.5	$ 837.74	$ 833.49	$ 848.65	$ 845.89
Annual savings in carbon tax for natural gas [$/year]	$ 208.25	$ 208.28	$ 208.94	$ 209.28	$ 211.32	$ 209.79	$ 209.1	$ 208.04	$ 211.82	$ 211.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,042.61	$ 1,042.74	$ 1,046.06	$ 1,047.74	$ 1,057.97	$ 1,050.29	$ 1,046.84	$ 1,041.53	$ 1,060.47	$ 1,057.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	4627.8	4628.4	4643.1	4650.6	4696	4661.9	4646.6	4623	4707.1	4691.8
Net Present Value [$]	$ 4,191.51	$ 4,149.77	$ 4,147.52	$ 4,089.38	$ 4,078.58	$ 3,999.6	$ 3,998.88	$ 3,988.2	$ 3,988.07	$ 3,987.53
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	8.78	10.51	8.78	8.78	14.09	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 1,162.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$.	$.	$ 550.	$.

MEDIUM 25SAR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,269.95	$ 18,299.34	$ 18,314.48	$ 18,331.15	$ 18,431.15	$ 18,441.15	$ 18,450.87	$ 18,491.15	$ 18,519.95	$ 18,549.34
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,441.46	$ 27,485.61	$ 27,508.35	$ 27,533.39	$ 27,683.59	$ 27,698.61	$ 27,713.21	$ 27,773.71	$ 27,816.96	$ 27,861.11
Net Present Value [$]	$ 20,352.51	$ 22,795.03	$ 20,612.86	$ 21,081.84	$ 20,892.39	$ 21,944.66	$ 20,620.16	$ 19,675.39	$ 22,683.33	$ 20,683.57
Incremental dollars per GHG saving	$ 2.02	$ 2.12	$ 2.02	$ 2.16	$ 2.04	$ 2.15	$ 2.04	$ 2.04	$ 2.14	$ 2.05
Auxiliary Energy Required Heating [GJ/yr]	92.8	93.2	92.8	87.6	92.9	90.3	92.9	90.7	92.4	92.4
Annual Energy DHW [GJ/yr]	16.5	24.4	16.5	27.5	16.5	25.6	16.5	16.5	24.4	16.5
Annual Energy Space Heating [GJ/yr]	60.4	61.2	60.6	57.7	60.8	59.4	60.5	59	60.7	60.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	105.4	114.2	105.7	113.9	106	113.7	105.6	104.2	113.8	105.5
Design Heating Load [W]	12561.3	13150.1	12627.8	12584.9	12882.5	12820.4	12607.7	12351.5	13030.2	12630.7
Annual Energy Electricity [kWh/yr]	24709.5	24954.5	24793.3	24008.2	24856.6	24460.8	24743.2	24360.6	24825.1	24729.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,433.08	$ 3,467.75	$ 3,444.94	$ 3,333.85	$ 3,453.89	$ 3,397.89	$ 3,437.85	$ 3,383.71	$ 3,449.44	$ 3,435.92
Annual Energy Natural Gas [m3/yr]	442.6	655.4	442.6	737.9	442.6	688.7	442.6	442.6	655.5	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 282.72	$ 190.92	$ 318.3	$ 190.92	$ 297.08	$ 190.92	$ 190.92	$ 282.76	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	37831	37614	35905	43444	27895	43427	36103	43429	37830	37633
Upgrade Package List	Pkg3231202033	Pkg3231201033	Pkg3221202034	Pkg3321201033	Pkg2321201033	Pkg3321201032	Pkg3221203033	Pkg3321201032	Pkg3231202033	Pkg3231201034
GHGI [kg/m2]	4.77	6.52	4.78	7.15	4.78	6.77	4.78	4.76	6.52	4.78
% ICC	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	110	110.5	109.9	103.8	110.1	107	110.1	107.4	109.5	109.5
Output: MEUI [kWh/(m2 * yr)]	94.4	104.8	94.7	104.4	95	104.2	94.5	92.9	104.3	94.4
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2040.0%	2010.0%	2040.0%	2490.0%	2030.0%	2260.0%	2030.0%	2220.0%	2080.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16506	16751	16589	15804	16653	16257	16539	16157	16621	16526
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,327.29	$ 2,361.83	$ 2,339.11	$ 2,228.41	$ 2,348.03	$ 2,292.22	$ 2,332.04	$ 2,278.09	$ 2,343.59	$ 2,330.12
Annual savings in carbon tax for electricity [$/year]	$ 8.25	$ 8.38	$ 8.29	$ 7.9	$ 8.33	$ 8.13	$ 8.27	$ 8.08	$ 8.31	$ 8.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,335.54	$ 2,370.21	$ 2,347.4	$ 2,236.31	$ 2,356.36	$ 2,300.35	$ 2,340.31	$ 2,286.17	$ 2,351.9	$ 2,338.39
Annual savings in GHG from electricity savings [kg CO2e/year]	181.6	184.3	182.5	173.8	183.2	178.8	181.9	177.7	182.8	181.8
Annual savings in natural gas [m3/year]	179.75	171.82	179.75	168.75	179.75	170.58	179.75	179.75	171.82	179.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,665.4	$ 1,591.94	$ 1,665.4	$ 1,563.46	$ 1,665.4	$ 1,580.45	$ 1,665.4	$ 1,665.4	$ 1,591.91	$ 1,665.4
Annual savings in carbon tax for natural gas [$/year]	$ 415.68	$ 397.34	$ 415.68	$ 390.23	$ 415.68	$ 394.47	$ 415.68	$ 415.68	$ 397.33	$ 415.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,081.08	$ 1,989.28	$ 2,081.08	$ 1,953.7	$ 2,081.08	$ 1,974.92	$ 2,081.08	$ 2,081.08	$ 1,989.24	$ 2,081.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	9237.3	8829.8	9237.3	8671.8	9237.3	8766	9237.3	9237.3	8829.6	9237.3
Net Present Value [$]	$ 20,352.51	$ 22,795.03	$ 20,612.86	$ 21,081.84	$ 20,892.39	$ 21,944.66	$ 20,620.16	$ 19,675.39	$ 22,683.33	$ 20,683.57
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	8.78	8.78	14.09	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR80	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 1,162.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	7.04	7.04	7.04	5.28	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 6,324.22	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 6,324.22
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$.	$.	$.	$ 550.	$.	$.	$ 850.	$.

MEDIUM 25SAR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 18,269.95	$ 18,314.48	$ 18,431.15	$ 18,450.87	$ 18,491.15	$ 20,205.15	$ 18,549.34	$ 18,819.95	$ 18,651.76	$ 20,381.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,441.46	$ 27,508.35	$ 27,683.59	$ 27,713.21	$ 27,773.71	$ 30,348.14	$ 27,861.11	$ 28,267.56	$ 28,014.94	$ 30,612.61
Net Present Value [$]	$ 20,352.51	$ 20,612.86	$ 20,892.39	$ 20,620.16	$ 19,675.39	$ 25,621.89	$ 20,683.57	$ 20,556.51	$ 20,787.09	$ 25,344.62
Incremental dollars per GHG saving	$ 2.02	$ 2.02	$ 2.04	$ 2.04	$ 2.04	$ 2.05	$ 2.05	$ 2.06	$ 2.06	$ 2.06
Auxiliary Energy Required Heating [GJ/yr]	92.8	92.8	92.9	92.9	90.7	93.3	92.4	92.8	92	92.5
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	16.5	9.5	16.5	14.9	16.5	9.5
Annual Energy Space Heating [GJ/yr]	60.4	60.6	60.8	60.5	59	60.8	60.3	60.4	60.3	60.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	105.4	105.7	106	105.6	104.2	98.8	105.5	103.9	105.5	98.2
Design Heating Load [W]	12561.3	12627.8	12882.5	12607.7	12351.5	12534.4	12630.7	12561.3	12762.6	12348.1
Annual Energy Electricity [kWh/yr]	24709.5	24793.3	24856.6	24743.2	24360.6	27444.7	24729.6	24711.5	24730	27268.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,433.08	$ 3,444.94	$ 3,453.89	$ 3,437.85	$ 3,383.71	$ 3,820.11	$ 3,435.92	$ 3,433.36	$ 3,435.98	$ 3,795.19
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	442.6	0	442.6	400.7	442.6	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$.	$ 190.92	$ 172.85	$ 190.92	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	37831	35905	27895	36103	43429	43468	37633	37832	28111	45610
Upgrade Package List	Pkg3231202033	Pkg3221202034	Pkg3231201033	Pkg3221203033	Pkg3231201032	Pkg3321201034	Pkg3231201034	Pkg3231202033	Pkg2321202033	Pkg3331202033
GHGI [kg/m2]	4.77	4.78	4.78	4.78	4.76	1.29	4.78	4.43	4.78	1.28
% ICC	3.5%	3.5%	3.5%	3.5%	3.5%	3.9%	3.5%	3.6%	3.6%	3.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	110	109.9	110.1	110.1	107.4	110.6	109.5	110	109.1	109.6
Output: MEUI [kWh/(m2 * yr)]	94.4	94.7	95	94.5	92.9	86.5	94.4	92.5	94.5	85.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2040.0%	2040.0%	2030.0%	2030.0%	2220.0%	2000.0%	2080.0%	2040.0%	2110.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16506	16589	16653	16539	16157	19241	16526	16508	16526	19065
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,327.29	$ 2,339.11	$ 2,348.03	$ 2,332.04	$ 2,278.09	$ 2,712.95	$ 2,330.12	$ 2,327.57	$ 2,330.18	$ 2,688.12
Annual savings in carbon tax for electricity [$/year]	$ 8.25	$ 8.29	$ 8.33	$ 8.27	$ 8.08	$ 9.62	$ 8.26	$ 8.25	$ 8.26	$ 9.53
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,335.54	$ 2,347.4	$ 2,356.36	$ 2,340.31	$ 2,286.17	$ 2,722.57	$ 2,338.39	$ 2,335.83	$ 2,338.44	$ 2,697.66
Annual savings in GHG from electricity savings [kg CO2e/year]	181.6	182.5	183.2	181.9	177.7	211.6	181.8	181.6	181.8	209.7
Annual savings in natural gas [m3/year]	179.75	179.75	179.75	179.75	179.75	196.24	179.75	181.31	179.75	196.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,818.19	$ 1,665.4	$ 1,679.87	$ 1,665.4	$ 1,818.19
Annual savings in carbon tax for natural gas [$/year]	$ 415.68	$ 415.68	$ 415.68	$ 415.68	$ 415.68	$ 453.81	$ 415.68	$ 419.29	$ 415.68	$ 453.81
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,272.	$ 2,081.08	$ 2,099.15	$ 2,081.08	$ 2,272.
Annual savings in GHG from natural gas savings [kg CO2e/year]	9237.3	9237.3	9237.3	9237.3	9237.3	10084.7	9237.3	9317.5	9237.3	10084.7
Net Present Value [$]	$ 20,352.51	$ 20,612.86	$ 20,892.39	$ 20,620.16	$ 19,675.39	$ 25,621.89	$ 20,683.57	$ 20,556.51	$ 20,787.09	$ 25,344.62
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	14.09	8.78	8.78	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR80	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 526.08	$ 305.47	$ 1,162.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	7.04	7.04	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 6,324.22	$ 6,324.22	$ 7,661.5	$ 6,324.22	$ 7,661.5	$ 7,661.5	$ 6,324.22	$ 6,324.22	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.

MEDIUM 25SAR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k	medium 25SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 34,201.65	$ 34,498.05	$ 34,975.65	$ 35,272.05	$ 21,068.29	$ 20,612.82	$ 21,568.29	$ 21,704.68	$ 21,112.82	$ 21,618.29
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 51,370.88	$ 51,816.07	$ 52,533.43	$ 52,978.62	$ 31,644.57	$ 30,960.46	$ 32,395.57	$ 32,600.43	$ 31,711.46	$ 32,470.67
Net Present Value [$]	$ 7,590.79	$ 7,887.19	$ 12,453.75	$ 12,750.15	$ 18,307.78	$ 18,414.86	$ 18,476.94	$ 18,507.06	$ 18,509.88	$ 18,511.6
Incremental dollars per GHG saving	$ 5.77	$ 5.82	$ 5.54	$ 5.59	$ 2.32	$ 2.27	$ 2.38	$ 2.39	$ 2.33	$ 2.36
Auxiliary Energy Required Heating [GJ/yr]	64.5	64.5	70.1	70.1	82	83.2	80.8	80.9	82	82
Annual Energy DHW [GJ/yr]	13.9	13.9	8.1	8.1	16.5	16.5	16.5	16.5	16.5	14.9
Annual Energy Space Heating [GJ/yr]	68.3	68.3	74.3	74.3	53.5	54.3	53	52.9	53.7	53.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	109.5	109.5	109.7	109.7	98.7	99.4	98.2	98.1	98.9	97.1
Design Heating Load [W]	9173.8	9173.8	9587.7	9587.7	11267.6	11384.5	11217.1	11197	11334	11267.6
Annual Energy Electricity [kWh/yr]	7932.4	7932.4	10219.6	10219.6	22828.3	23046.8	22699.8	22658.5	22889.5	22830.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,059.12	$ 1,059.12	$ 1,382.76	$ 1,382.76	$ 3,166.89	$ 3,197.81	$ 3,148.71	$ 3,142.86	$ 3,175.55	$ 3,167.16
Annual Energy Natural Gas [m3/yr]	2173.5	2173.5	1958.7	1958.7	442.6	442.6	442.6	442.6	442.6	400.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 937.57	$ 937.57	$ 844.91	$ 844.91	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 172.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	52404	52692	52407	52695	51565	50989	51583	51709	51007	51566
Upgrade Package List	Pkg4341303064	Pkg4341403064	Pkg4341303064	Pkg4341403064	Pkg4331302033	Pkg4321302033	Pkg4331302034	Pkg4331303033	Pkg4321302034	Pkg4331302033
GHGI [kg/m2]	18.13	18.13	16.48	16.48	4.69	4.7	4.68	4.68	4.69	4.34
% ICC	6.5%	6.6%	6.7%	6.7%	4.0%	3.9%	4.1%	4.2%	4.0%	4.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	76.4	76.4	83.1	83.1	97.2	98.6	95.8	95.9	97.1	97.2
Output: MEUI [kWh/(m2 * yr)]	99.4	99.4	99.7	99.7	86.3	87.3	85.8	85.6	86.6	84.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	4470.0%	4470.0%	3990.0%	3990.0%	2970.0%	2860.0%	3070.0%	3060.0%	2970.0%	2970.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	272	272	2016	2016	14624	14843	14496	14455	14686	14626
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 38.28	$ 38.28	$ 284.21	$ 284.21	$ 2,062.04	$ 2,092.85	$ 2,043.92	$ 2,038.1	$ 2,070.67	$ 2,062.31
Annual savings in carbon tax for electricity [$/year]	$ .14	$ .14	$ 1.01	$ 1.01	$ 7.31	$ 7.42	$ 7.25	$ 7.23	$ 7.34	$ 7.31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 38.42	$ 38.42	$ 285.22	$ 285.22	$ 2,069.35	$ 2,100.27	$ 2,051.17	$ 2,045.33	$ 2,078.01	$ 2,069.62
Annual savings in GHG from electricity savings [kg CO2e/year]	3	3	22.2	22.2	160.9	163.3	159.5	159	161.5	160.9
Annual savings in natural gas [m3/year]	115.26	115.26	123.26	123.26	179.75	179.75	179.75	179.75	179.75	181.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,067.89	$ 1,067.89	$ 1,142.04	$ 1,142.04	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,665.4	$ 1,679.87
Annual savings in carbon tax for natural gas [$/year]	$ 266.54	$ 266.54	$ 285.05	$ 285.05	$ 415.68	$ 415.68	$ 415.68	$ 415.68	$ 415.68	$ 419.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,334.43	$ 1,334.43	$ 1,427.09	$ 1,427.09	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,081.08	$ 2,099.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	5923.1	5923.1	6334.4	6334.4	9237.3	9237.3	9237.3	9237.3	9237.3	9317.5
Net Present Value [$]	$ 7,590.79	$ 7,887.19	$ 12,453.75	$ 12,750.15	$ 18,307.78	$ 18,414.86	$ 18,476.94	$ 18,507.06	$ 18,509.88	$ 18,511.6
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	10.51	10.51	10.51	14.09	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 15,098.61	$ 15,098.61	$ 15,098.61	$ 15,098.61	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35	$ 1,875.35
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5	$ 7,661.5
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,860.71	$ 1,860.71	$ 1,860.71	$ 1,860.71	$ 787.	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$.	$.	$.	$.	$.	$ 550.

MEDIUM 50SAR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 12,787.65	$ 13,008.26	$ 13,028.85	$ 13,243.12	$ 13,249.46	$ 13,287.65	$ 13,337.65	$ 13,387.65	$ 13,463.73	$ 13,470.05
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,787.65	$ 13,008.26	$ 13,028.85	$ 13,243.12	$ 13,249.46	$ 13,287.65	$ 13,337.65	$ 13,387.65	$ 13,463.73	$ 13,470.05
Net Present Value [$]	$ 7,127.99	$ 7,291.14	$ 8,116.65	$ 7,425.59	$ 8,279.99	$ 7,109.44	$ 7,392.39	$ 5,945.85	$ 7,589.29	$ 8,526.5
Incremental dollars per GHG saving	$ 3.66	$ 3.72	$ 3.74	$ 3.79	$ 3.8	$ 3.8	$ 3.75	$ 3.33	$ 3.85	$ 3.86
Auxiliary Energy Required Heating [GJ/yr]	39	38.7	42.5	38.3	42.1	36.9	39	41.1	38	42.7
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	23.7	23.7	23.7	22.4	13.5	23.7	23.7
Annual Energy Space Heating [GJ/yr]	13.9	13.8	14.9	13.6	14.8	13.1	13.9	14.6	13.6	14.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	65	64.9	66.1	64.7	66	64.3	63.7	55.5	64.7	66
Design Heating Load [W]	8939.1	8884.7	8939.1	8856.4	8884.7	8559.2	8939.1	8815.3	8802	8675.1
Annual Energy Electricity [kWh/yr]	11472.6	11449.9	11758.7	11412.6	11736.1	11271.2	11472.6	11670.5	11390.1	11745.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,560.06	$ 1,556.85	$ 1,600.54	$ 1,551.57	$ 1,597.34	$ 1,531.56	$ 1,560.06	$ 1,588.06	$ 1,548.38	$ 1,598.73
Annual Energy Natural Gas [m3/yr]	635.7	635.8	637	635.3	637.1	635.7	601.6	362.1	635.4	637.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.22	$ 274.26	$ 274.78	$ 274.05	$ 274.82	$ 274.22	$ 259.51	$ 156.2	$ 274.09	$ 274.87
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	159850	160120	159796	161470	160066	169570	159851	159853	161740	175834
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1121101021	Pkg1131101031	Pkg1121102021	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131102031	Pkg2221101011
GHGI [kg/m2]	5.73	5.73	5.76	5.73	5.75	5.72	5.45	3.51	5.72	5.76
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.2	45.8	50.3	45.4	49.9	43.7	46.2	48.7	45	50.6
Output: MEUI [kWh/(m2 * yr)]	46.5	46.4	47.8	46.2	47.7	45.6	45	35.3	46.1	47.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2020.0%	2090.0%	1310.0%	2170.0%	1390.0%	2450.0%	2020.0%	1600.0%	2230.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3811	3788	4097	3751	4074	3609	3811	4009	3728	4084
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 537.31	$ 534.11	$ 577.65	$ 528.85	$ 574.46	$ 508.91	$ 537.31	$ 565.21	$ 525.68	$ 575.84
Annual savings in carbon tax for electricity [$/year]	$ 1.91	$ 1.89	$ 2.05	$ 1.88	$ 2.04	$ 1.8	$ 1.91	$ 2.	$ 1.86	$ 2.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 539.21	$ 536.	$ 579.7	$ 530.72	$ 576.5	$ 510.72	$ 539.21	$ 567.22	$ 527.54	$ 577.89
Annual savings in GHG from electricity savings [kg CO2e/year]	41.9	41.7	45.1	41.3	44.8	39.7	41.9	44.1	41	44.9
Annual savings in natural gas [m3/year]	68.81	68.81	68.77	68.83	68.76	68.81	70.08	79.01	68.82	68.76
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 637.56	$ 637.52	$ 637.11	$ 637.7	$ 637.07	$ 637.56	$ 649.33	$ 732.	$ 637.66	$ 637.04
Annual savings in carbon tax for natural gas [$/year]	$ 159.13	$ 159.12	$ 159.02	$ 159.17	$ 159.01	$ 159.13	$ 162.07	$ 182.7	$ 159.16	$ 159.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 796.69	$ 796.65	$ 796.13	$ 796.86	$ 796.08	$ 796.69	$ 811.4	$ 914.71	$ 796.82	$ 796.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	3536.2	3536.1	3533.8	3537	3533.6	3536.2	3601.5	4060.1	3536.8	3533.4
Net Present Value [$]	$ 7,127.99	$ 7,291.14	$ 8,116.65	$ 7,425.59	$ 8,279.99	$ 7,109.44	$ 7,392.39	$ 5,945.85	$ 7,589.29	$ 8,526.5
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	8.78	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM 50SAR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,382.26	$ 14,617.12	$ 14,661.65	$ 14,711.65	$ 14,837.73	$ 14,882.26	$ 14,932.26	$ 15,011.65	$ 15,117.12	$ 15,167.12
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,382.26	$ 14,617.12	$ 14,661.65	$ 14,711.65	$ 14,837.73	$ 14,882.26	$ 14,932.26	$ 15,011.65	$ 15,117.12	$ 15,167.12
Net Present Value [$]	$ 10,165.67	$ 10,256.1	$ 9,979.1	$ 10,107.61	$ 10,403.68	$ 10,126.31	$ 10,254.82	$ 10,117.49	$ 10,228.62	$ 10,354.21
Incremental dollars per GHG saving	$ 3.07	$ 3.12	$ 3.13	$ 3.14	$ 3.17	$ 3.18	$ 3.19	$ 3.2	$ 3.23	$ 3.24
Auxiliary Energy Required Heating [GJ/yr]	43.9	43.6	42.1	44	43.3	41.8	43.7	43.9	41.4	43.4
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.8	7.8	7.3	6.9	7.8	7.3
Annual Energy Space Heating [GJ/yr]	15.6	15.4	14.9	15.6	15.3	14.8	15.5	15.6	14.6	15.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	50.8	50.6	50.1	50.2	50.5	50	50.1	49.8	49.8	49.9
Design Heating Load [W]	8884.7	8856.4	8559.2	8939.1	8802	8504.9	8884.7	8939.1	8476.5	8856.4
Annual Energy Electricity [kWh/yr]	14101.4	14045.3	13920.4	13950.9	14016.9	13891.9	13922.4	13838.2	13840.4	13869.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,932.03	$ 1,924.09	$ 1,906.42	$ 1,910.74	$ 1,920.08	$ 1,902.39	$ 1,906.7	$ 1,894.79	$ 1,895.1	$ 1,899.26
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	160126	161476	169576	159857	161746	169846	160127	159858	171196	161477
Upgrade Package List	Pkg122102031	Pkg1131101031	Pkg2121101031	Pkg1121101031	Pkg1131102031	Pkg2121102031	Pkg1121102031	Pkg1121101031	Pkg2131101031	Pkg1131101031
GHGI [kg/m2]	0.66	0.65	0.65	0.65	0.66	0.65	0.65	0.65	0.65	0.65
% ICC	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	52	51.7	49.9	52.2	51.3	49.5	51.8	52	49.1	51.4
Output: MEUI [kWh/(m2 * yr)]	29.6	29.4	28.9	29	29.3	28.7	28.9	28.5	28.5	28.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1020.0%	1080.0%	1390.0%	1000.0%	1150.0%	1450.0%	1060.0%	1020.0%	1530.0%	1120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6440	6383	6258	6289	6355	6230	6260	6176	6178	6208
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 907.97	$ 900.06	$ 882.45	$ 886.75	$ 896.06	$ 878.43	$ 882.73	$ 870.86	$ 871.17	$ 875.31
Annual savings in carbon tax for electricity [$/year]	$ 3.22	$ 3.19	$ 3.13	$ 3.14	$ 3.18	$ 3.12	$ 3.13	$ 3.09	$ 3.09	$ 3.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 911.19	$ 903.25	$ 885.58	$ 889.89	$ 899.23	$ 881.54	$ 885.86	$ 873.95	$ 874.26	$ 878.42
Annual savings in GHG from electricity savings [kg CO2e/year]	70.8	70.2	68.8	69.2	69.9	68.5	68.9	67.9	68	68.3
Annual savings in natural gas [m3/year]	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.	$ 857.
Annual savings in carbon tax for natural gas [$/year]	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9	$ 213.9
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91	$ 1,070.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	4753.4	4753.4	4753.4	4753.4	4753.4	4753.4	4753.4	4753.4	4753.4	4753.4
Net Present Value [$]	$ 10,165.67	$ 10,256.1	$ 9,979.1	$ 10,107.61	$ 10,403.68	$ 10,126.31	$ 10,254.82	$ 10,117.49	$ 10,228.62	$ 10,354.21
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 50SAR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,387.65	$ 13,608.26	$ 13,843.12	$ 13,937.65	$ 14,063.73	$ 14,237.65	$ 14,158.26	$ 14,393.12	$ 14,458.26	$ 14,693.12
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,387.65	$ 13,608.26	$ 13,843.12	$ 13,937.65	$ 14,063.73	$ 14,237.65	$ 14,158.26	$ 14,393.12	$ 14,458.26	$ 14,693.12
Net Present Value [$]	$ 5,945.85	$ 6,107.48	$ 6,204.86	$ 6,253.82	$ 6,371.06	$ 6,398.34	$ 6,415.82	$ 6,513.19	$ 6,560.35	$ 6,657.72
Incremental dollars per GHG saving	$ 3.33	$ 3.39	$ 3.45	$ 3.42	$ 3.5	$ 3.47	$ 3.48	$ 3.53	$ 3.52	$ 3.58
Auxiliary Energy Required Heating [GJ/yr]	41.1	40.7	40.4	41.1	40.1	41.1	40.7	40.4	40.8	40.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	11.7	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	14.6	14.5	14.3	14.6	14.2	14.6	14.5	14.3	14.5	14.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	55.5	55.4	55.2	54.4	55.1	53.7	54.3	54.1	53.6	53.4
Design Heating Load [W]	8815.3	8761	8732.6	8815.3	8678.3	8815.3	8761	8732.6	8761	8732.6
Annual Energy Electricity [kWh/yr]	11670.5	11647.6	11594.2	11671.2	11573	11671.7	11648.4	11595	11648.9	11595.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,588.06	$ 1,584.82	$ 1,577.26	$ 1,588.16	$ 1,574.26	$ 1,588.23	$ 1,584.93	$ 1,577.38	$ 1,585.	$ 1,577.45
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	333	362.1	314.3	333	333	314.3	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 143.64	$ 135.58	$ 135.58
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	159853	160123	161473	159854	161743	159855	160124	161474	160125	161475
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg1121101031	Pkg1131102031	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg1121102031	Pkg1131101031
GHGI [kg/m2]	3.51	3.5	3.5	3.27	3.5	3.12	3.27	3.26	3.11	3.11
% ICC	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	48.7	48.3	47.9	48.7	47.5	48.7	48.3	47.9	48.3	47.9
Output: MEUI [kWh/(m2 * yr)]	35.3	35.2	34.9	34	34.8	33.1	33.9	33.6	33.1	32.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1600.0%	1680.0%	1740.0%	1600.0%	1800.0%	1600.0%	1680.0%	1740.0%	1660.0%	1740.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4009	3986	3932	4009	3911	4010	3986	3933	3987	3934
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 565.21	$ 561.98	$ 554.45	$ 565.31	$ 551.47	$ 565.38	$ 562.1	$ 554.57	$ 562.17	$ 554.64
Annual savings in carbon tax for electricity [$/year]	$ 2.	$ 1.99	$ 1.97	$ 2.	$ 1.96	$ 2.	$ 1.99	$ 1.97	$ 1.99	$ 1.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 567.22	$ 563.98	$ 556.42	$ 567.32	$ 553.42	$ 567.39	$ 564.09	$ 556.53	$ 564.16	$ 556.6
Annual savings in GHG from electricity savings [kg CO2e/year]	44.1	43.8	43.3	44.1	43	44.1	43.9	43.3	43.9	43.3
Annual savings in natural gas [m3/year]	79.01	79.01	79.01	80.09	79.01	80.79	80.09	80.09	80.79	80.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 732.	$ 732.	$ 742.05	$ 732.	$ 748.51	$ 742.05	$ 742.05	$ 748.51	$ 748.51
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 182.7	$ 182.7	$ 185.21	$ 182.7	$ 186.82	$ 185.21	$ 185.21	$ 186.82	$ 186.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 914.71	$ 914.71	$ 927.26	$ 914.71	$ 935.33	$ 927.26	$ 927.26	$ 935.33	$ 935.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4060.1	4060.1	4115.8	4060.1	4151.6	4115.8	4115.8	4151.6	4151.6
Net Present Value [$]	$ 5,945.85	$ 6,107.48	$ 6,204.86	$ 6,253.82	$ 6,371.06	$ 6,398.34	$ 6,415.82	$ 6,513.19	$ 6,560.35	$ 6,657.72
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.

MEDIUM 50SAR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,837.65	$ 13,887.65	$ 14,058.26	$ 14,108.26	$ 14,137.65	$ 14,293.12	$ 14,343.12	$ 14,358.26	$ 14,437.65	$ 14,513.73
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,837.65	$ 13,887.65	$ 14,058.26	$ 14,108.26	$ 14,137.65	$ 14,293.12	$ 14,343.12	$ 14,358.26	$ 14,437.65	$ 14,513.73
Net Present Value [$]	$ 7,373.85	$ 5,926.58	$ 7,536.22	$ 6,077.44	$ 7,490.41	$ 7,626.72	$ 6,188.51	$ 7,652.78	$ 6,234.91	$ 7,789.45
Incremental dollars per GHG saving	$ 3.89	$ 3.46	$ 3.95	$ 3.51	$ 3.92	$ 4.01	$ 3.57	$ 3.98	$ 3.54	$ 4.07
Auxiliary Energy Required Heating [GJ/yr]	36.9	39	36.5	38.6	36.9	36.2	38.3	36.5	39	35.9
Annual Energy DHW [GJ/yr]	22.4	13.5	22.4	13.5	21.6	22.4	13.5	21.6	12.4	22.4
Annual Energy Space Heating [GJ/yr]	13.1	13.8	13	13.7	13.1	12.8	13.6	13	13.8	12.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	63	54.8	62.9	54.7	62.2	62.7	54.5	62.1	53.7	62.6
Design Heating Load [W]	8559.2	8437.6	8504.9	8383.3	8559.2	8476.5	8354.9	8504.9	8437.6	8422.2
Annual Energy Electricity [kWh/yr]	11271.2	11468.8	11248.6	11441.7	11271.2	11193.8	11393.6	11248.6	11469.6	11171.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,531.56	$ 1,559.52	$ 1,528.36	$ 1,555.69	$ 1,531.56	$ 1,520.61	$ 1,548.88	$ 1,528.36	$ 1,559.63	$ 1,517.42
Annual Energy Natural Gas [m3/yr]	601.6	362.1	601.6	362.1	579.7	601.2	362.1	579.7	333	601.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 259.51	$ 156.2	$ 259.51	$ 156.2	$ 250.06	$ 259.34	$ 156.2	$ 250.06	$ 143.64	$ 259.34
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	169571	169573	169841	169843	169572	171191	171193	169842	169574	171461
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2131101031	Pkg2121102031	Pkg2121101031	Pkg2131102031
GHGI [kg/m2]	5.44	3.5	5.44	3.49	5.26	5.44	3.49	5.26	3.26	5.44
% ICC	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.7	46.2	43.3	45.8	43.7	42.9	45.4	43.3	46.2	42.5
Output: MEUI [kWh/(m2 * yr)]	44.1	34.4	44	34.3	43.1	43.8	34.1	43.1	33.1	43.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2450.0%	2020.0%	2540.0%	2110.0%	2450.0%	2600.0%	2170.0%	2540.0%	2020.0%	2660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3609	3807	3587	3780	3609	3532	3732	3587	3808	3509
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 508.91	$ 536.77	$ 505.72	$ 532.95	$ 508.91	$ 498.	$ 526.17	$ 505.72	$ 536.89	$ 494.83
Annual savings in carbon tax for electricity [$/year]	$ 1.8	$ 1.9	$ 1.79	$ 1.89	$ 1.8	$ 1.77	$ 1.87	$ 1.79	$ 1.9	$ 1.75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 510.72	$ 538.68	$ 507.52	$ 534.84	$ 510.72	$ 499.76	$ 528.04	$ 507.52	$ 538.79	$ 496.58
Annual savings in GHG from electricity savings [kg CO2e/year]	39.7	41.9	39.5	41.6	39.7	38.9	41	39.5	41.9	38.6
Annual savings in natural gas [m3/year]	70.08	79.01	70.08	79.01	70.9	70.1	79.01	70.9	80.09	70.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 649.33	$ 732.	$ 649.33	$ 732.	$ 656.89	$ 649.47	$ 732.	$ 656.89	$ 742.05	$ 649.47
Annual savings in carbon tax for natural gas [$/year]	$ 162.07	$ 182.7	$ 162.07	$ 182.7	$ 163.96	$ 162.1	$ 182.7	$ 163.96	$ 185.21	$ 162.1
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 811.4	$ 914.71	$ 811.4	$ 914.71	$ 820.84	$ 811.57	$ 914.71	$ 820.84	$ 927.26	$ 811.57
Annual savings in GHG from natural gas savings [kg CO2e/year]	3601.5	4060.1	3601.5	4060.1	3643.5	3602.3	4060.1	3643.5	4115.8	3602.3
Net Present Value [$]	$ 7,373.85	$ 5,926.58	$ 7,536.22	$ 6,077.44	$ 7,490.41	$ 7,626.72	$ 6,188.51	$ 7,652.78	$ 6,234.91	$ 7,789.45
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 550.

MEDIUM 50SAR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,887.65	$ 14,108.26	$ 14,437.65	$ 14,343.12	$ 14,737.65	$ 14,658.26	$ 16,917.12	$ 14,563.73	$ 14,958.26	$ 14,893.12
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,887.65	$ 14,108.26	$ 14,437.65	$ 14,343.12	$ 14,737.65	$ 14,658.26	$ 16,917.12	$ 14,563.73	$ 14,958.26	$ 14,893.12
Net Present Value [$]	$ 5,926.58	$ 6,077.44	$ 6,234.91	$ 6,188.51	$ 6,379.44	$ 6,385.41	$ 12,242.97	$ 6,339.55	$ 6,529.94	$ 6,496.66
Incremental dollars per GHG saving	$ 3.46	$ 3.51	$ 3.54	$ 3.57	$ 3.59	$ 3.6	$ 3.61	$ 3.62	$ 3.64	$ 3.66
Auxiliary Energy Required Heating [GJ/yr]	39	38.6	39	38.3	39	38.6	39	38	38.6	38.3
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	7.8	13.5	11.7	12.4
Annual Energy Space Heating [GJ/yr]	13.8	13.7	13.8	13.6	13.8	13.7	13.9	13.5	13.7	13.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7	0.7	0.7
Total Energy [GJ/yr]	54.8	54.7	53.7	54.5	53	53.6	50.1	54.4	52.9	53.4
Design Heating Load [W]	8437.6	8383.3	8437.6	8354.9	8437.6	8383.3	7950.5	8300.6	8383.3	8354.9
Annual Energy Electricity [kWh/yr]	11468.8	11441.7	11469.6	11393.6	11470.1	11442.4	13923.7	11366.6	11442.9	11394.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,559.52	$ 1,555.69	$ 1,559.63	$ 1,548.88	$ 1,559.7	$ 1,555.78	$ 1,906.89	$ 1,545.06	$ 1,555.86	$ 1,548.99
Annual Energy Natural Gas [m3/yr]	362.1	362.1	333	362.1	314.3	333	0	362.1	314.3	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$.	$ 156.2	$ 135.58	$ 143.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	169573	169843	169574	171193	169575	169844	171232	171463	169845	171194
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131101033	Pkg2131102031	Pkg2121102031	Pkg2131101031
GHGI [kg/m2]	3.5	3.49	3.26	3.49	3.11	3.26	0.65	3.49	3.1	3.25
% ICC	2.7%	2.7%	2.8%	2.7%	2.8%	2.8%	3.2%	2.8%	2.9%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.2	45.8	46.2	45.4	46.2	45.8	46.2	45	45.8	45.4
Output: MEUI [kWh/(m2 * yr)]	34.4	34.3	33.1	34.1	32.3	33	28.9	34	32.2	32.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2020.0%	2110.0%	2020.0%	2170.0%	2020.0%	2110.0%	2020.0%	2230.0%	2110.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3807	3780	3808	3732	3808	3780	6262	3705	3781	3732
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 536.77	$ 532.95	$ 536.89	$ 526.17	$ 536.96	$ 533.05	$ 882.91	$ 522.36	$ 533.12	$ 526.28
Annual savings in carbon tax for electricity [$/year]	$ 1.9	$ 1.89	$ 1.9	$ 1.87	$ 1.9	$ 1.89	$ 3.13	$ 1.85	$ 1.89	$ 1.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 538.68	$ 534.84	$ 538.79	$ 528.04	$ 538.86	$ 534.94	$ 886.04	$ 524.22	$ 535.01	$ 528.15
Annual savings in GHG from electricity savings [kg CO2e/year]	41.9	41.6	41.9	41	41.9	41.6	68.9	40.8	41.6	41.1
Annual savings in natural gas [m3/year]	79.01	79.01	80.09	79.01	80.79	80.09	92.5	79.01	80.79	80.09
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 732.	$ 742.05	$ 732.	$ 748.51	$ 742.05	$ 857.	$ 732.	$ 748.51	$ 742.05
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 182.7	$ 185.21	$ 182.7	$ 186.82	$ 185.21	$ 213.9	$ 182.7	$ 186.82	$ 185.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 914.71	$ 927.26	$ 914.71	$ 935.33	$ 927.26	$ 1,070.91	$ 914.71	$ 935.33	$ 927.26
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4060.1	4115.8	4060.1	4151.6	4115.8	4753.4	4060.1	4151.6	4115.8
Net Present Value [$]	$ 5,926.58	$ 6,077.44	$ 6,234.91	$ 6,188.51	$ 6,379.44	$ 6,385.41	$ 12,242.97	$ 6,339.55	$ 6,529.94	$ 6,496.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.

MEDIUM 50SAR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,887.65	$ 14,108.26	$ 14,343.12	$ 14,437.65	$ 14,563.73	$ 14,737.65	$ 14,658.26	$ 14,893.12	$ 14,958.26	$ 15,193.12
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,887.65	$ 14,108.26	$ 14,343.12	$ 14,437.65	$ 14,563.73	$ 14,737.65	$ 14,658.26	$ 14,893.12	$ 14,958.26	$ 15,193.12
Net Present Value [$]	$ 5,926.58	$ 6,077.44	$ 6,188.51	$ 6,234.91	$ 6,339.55	$ 6,379.44	$ 6,385.41	$ 6,496.66	$ 6,529.94	$ 6,641.19
Incremental dollars per GHG saving	$ 3.46	$ 3.51	$ 3.57	$ 3.54	$ 3.62	$ 3.59	$ 3.6	$ 3.66	$ 3.64	$ 3.7
Auxiliary Energy Required Heating [GJ/yr]	39	38.6	38.3	39	38	39	38.6	38.3	38.6	38.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	11.7	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	13.8	13.7	13.6	13.8	13.5	13.8	13.7	13.6	13.7	13.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	54.8	54.7	54.5	53.7	54.4	53	53.6	53.4	52.9	52.7
Design Heating Load [W]	8437.6	8383.3	8354.9	8437.6	8300.6	8437.6	8383.3	8354.9	8383.3	8354.9
Annual Energy Electricity [kWh/yr]	11468.8	11441.7	11393.6	11469.6	11366.6	11470.1	11442.4	11394.4	11442.9	11394.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,559.52	$ 1,555.69	$ 1,548.88	$ 1,559.63	$ 1,545.06	$ 1,559.7	$ 1,555.78	$ 1,548.99	$ 1,555.86	$ 1,549.06
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	333	362.1	314.3	333	333	314.3	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 143.64	$ 135.58	$ 135.58
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	169573	169843	171193	169574	171463	169575	169844	171194	169845	171195
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121102031	Pkg2131101031
GHGI [kg/m2]	3.5	3.49	3.4	3.26	3.49	3.11	3.26	3.25	3.1	3.1
% ICC	2.7%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.2	45.8	45.4	46.2	45	46.2	45.8	45.4	45.8	45.4
Output: MEUI [kWh/(m2 * yr)]	34.4	34.3	34.1	33.1	34	32.3	33	32.8	32.2	32
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2020.0%	2110.0%	2170.0%	2020.0%	2230.0%	2020.0%	2110.0%	2170.0%	2110.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3807	3780	3732	3808	3705	3808	3780	3732	3781	3733
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 536.77	$ 532.95	$ 526.17	$ 536.89	$ 522.36	$ 536.96	$ 533.05	$ 526.28	$ 533.12	$ 526.35
Annual savings in carbon tax for electricity [$/year]	$ 1.9	$ 1.89	$ 1.87	$ 1.9	$ 1.85	$ 1.9	$ 1.89	$ 1.87	$ 1.89	$ 1.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 538.68	$ 534.84	$ 528.04	$ 538.79	$ 524.22	$ 538.86	$ 534.94	$ 528.15	$ 535.01	$ 528.22
Annual savings in GHG from electricity savings [kg CO2e/year]	41.9	41.6	41	41.9	40.8	41.9	41.6	41.1	41.6	41.1
Annual savings in natural gas [m3/year]	79.01	79.01	79.01	80.09	79.01	80.79	80.09	80.09	80.79	80.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 732.	$ 732.	$ 742.05	$ 732.	$ 748.51	$ 742.05	$ 742.05	$ 748.51	$ 748.51
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 182.7	$ 182.7	$ 185.21	$ 182.7	$ 186.82	$ 185.21	$ 185.21	$ 186.82	$ 186.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 914.71	$ 914.71	$ 927.26	$ 914.71	$ 935.33	$ 927.26	$ 927.26	$ 935.33	$ 935.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4060.1	4060.1	4115.8	4060.1	4151.6	4115.8	4115.8	4151.6	4151.6
Net Present Value [$]	$ 5,926.58	$ 6,077.44	$ 6,188.51	$ 6,234.91	$ 6,339.55	$ 6,379.44	$ 6,385.41	$ 6,496.66	$ 6,529.94	$ 6,641.19
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.

MEDIUM 50SAR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 25,376.48	$ 25,672.88	$ 25,813.8	$ 25,926.48	$ 26,110.2	$ 26,222.88	$ 26,226.48	$ 26,363.8	$ 26,450.19	$ 26,522.88
ICC with multiplier (Van=1.0,this Cz =1)	$ 25,376.48	$ 25,672.88	$ 25,813.8	$ 25,926.48	$ 26,110.2	$ 26,222.88	$ 26,226.48	$ 26,363.8	$ 26,450.19	$ 26,522.88
Net Present Value [$]	$ 14,614.19	$ 14,910.59	$ 14,972.81	$ 14,922.16	$ 15,269.21	$ 15,218.56	$ 15,066.68	$ 15,280.6	$ 15,563.56	$ 15,363.08
Incremental dollars per GHG saving	$ 6.3	$ 6.37	$ 6.41	$ 6.35	$ 6.48	$ 6.42	$ 6.36	$ 6.45	$ 6.56	$ 6.44
Auxiliary Energy Required Heating [GJ/yr]	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	23.9	24.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	12.4	11.7	12.4	13.5	11.7
Annual Energy Space Heating [GJ/yr]	8.8	8.8	8.7	8.8	8.7	8.8	8.8	8.7	8.6	8.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	50.9	50.9	50.7	49.8	50.7	49.8	49.1	49.7	50.7	49.1
Design Heating Load [W]	6362.8	6362.8	6337.6	6362.8	6337.6	6362.8	6362.8	6337.6	6305.6	6362.8
Annual Energy Electricity [kWh/yr]	10380.7	10380.7	10350.1	10381.4	10350.1	10381.4	10381.9	10350.8	10332.4	10381.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,405.55	$ 1,405.55	$ 1,401.22	$ 1,405.65	$ 1,401.22	$ 1,405.65	$ 1,405.72	$ 1,401.32	$ 1,398.72	$ 1,405.72
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	333	362.1	333	314.3	333	362.1	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 143.64	$ 135.58	$ 143.64	$ 156.2	$ 135.58
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	209839	210127	210271	209840	210559	210128	209841	210272	210415	210129
Upgrade Package List	Pkg4331303034	Pkg4331403034	Pkg4331302034	Pkg4331303034	Pkg4341402034	Pkg4331403034	Pkg4331303034	Pkg4341302034	Pkg4341303034	Pkg4331403034
GHGI [kg/m2]	3.44	3.44	3.44	3.21	3.44	3.21	3.05	3.21	3.44	3.05
% ICC	4.9%	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%	5.1%	5.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.3	28.8
Output: MEUI [kWh/(m2 * yr)]	29.8	29.8	29.6	28.5	29.6	28.5	27.6	28.3	29.5	27.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5110.0%	5030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2719	2719	2688	2720	2688	2720	2720	2689	2670	2720
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 383.35	$ 383.35	$ 379.04	$ 383.45	$ 379.04	$ 383.45	$ 383.52	$ 379.13	$ 376.54	$ 383.52
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.36	$ 1.34	$ 1.36	$ 1.34	$ 1.36	$ 1.36	$ 1.34	$ 1.34	$ 1.36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 384.71	$ 384.71	$ 380.38	$ 384.81	$ 380.38	$ 384.81	$ 384.88	$ 380.48	$ 377.88	$ 384.88
Annual savings in GHG from electricity savings [kg CO2e/year]	29.9	29.9	29.6	29.9	29.6	29.9	29.9	29.6	29.4	29.9
Annual savings in natural gas [m3/year]	79.01	79.01	79.01	80.09	79.01	80.09	80.79	80.09	79.01	80.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 732.	$ 732.	$ 742.05	$ 732.	$ 742.05	$ 748.51	$ 742.05	$ 732.	$ 748.51
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 182.7	$ 182.7	$ 185.21	$ 182.7	$ 185.21	$ 186.82	$ 185.21	$ 182.7	$ 186.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 914.71	$ 914.71	$ 927.26	$ 914.71	$ 927.26	$ 935.33	$ 927.26	$ 914.71	$ 935.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4060.1	4060.1	4115.8	4060.1	4115.8	4151.6	4115.8	4060.1	4151.6
Net Present Value [$]	$ 14,614.19	$ 14,910.59	$ 14,972.81	$ 14,922.16	$ 15,269.21	$ 15,218.56	$ 15,066.68	$ 15,280.6	$ 15,563.56	$ 15,363.08
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.51	14.09	10.51	14.09	14.09	10.51	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 1,860.71	$ 787.	$ 1,860.71	$ 787.	$ 787.	$ 1,860.71	$ 1,860.71	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.

MEDIUM 50SAR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,376.48	$ 25,926.48	$ 26,226.48	$ 25,672.88	$ 25,813.8	$ 26,222.88	$ 26,522.88	$ 26,363.8	$ 26,663.8	$ 26,110.2
ICC with multiplier (Van=1.0,this Cz =1)	$ 25,376.48	$ 25,926.48	$ 26,226.48	$ 25,672.88	$ 25,813.8	$ 26,222.88	$ 26,522.88	$ 26,363.8	$ 26,663.8	$ 26,110.2
Net Present Value [$]	$ 14,614.19	$ 14,922.16	$ 15,066.68	$ 14,910.59	$ 14,972.81	$ 15,218.56	$ 15,363.08	$ 15,280.6	$ 15,425.31	$ 15,269.21
Incremental dollars per GHG saving	$ 6.3	$ 6.35	$ 6.36	$ 6.37	$ 6.41	$ 6.42	$ 6.44	$ 6.45	$ 6.47	$ 6.48
Auxiliary Energy Required Heating [GJ/yr]	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3
Annual Energy DHW [GJ/yr]	13.5	12.4	11.7	13.5	13.5	12.4	11.7	12.4	11.7	13.5
Annual Energy Space Heating [GJ/yr]	8.8	8.8	8.8	8.8	8.7	8.8	8.8	8.7	8.7	8.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	50.9	49.8	49.1	50.9	50.7	49.8	49.1	49.7	49	50.7
Design Heating Load [W]	6362.8	6362.8	6362.8	6362.8	6337.6	6362.8	6362.8	6337.6	6337.6	6337.6
Annual Energy Electricity [kWh/yr]	10380.7	10381.4	10381.9	10380.7	10350.1	10381.4	10381.9	10350.8	10351.3	10350.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,405.55	$ 1,405.65	$ 1,405.72	$ 1,405.55	$ 1,401.22	$ 1,405.65	$ 1,405.72	$ 1,401.32	$ 1,401.39	$ 1,401.22
Annual Energy Natural Gas [m3/yr]	362.1	333	314.3	362.1	362.1	333	314.3	333	314.3	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 135.58	$ 156.2	$ 156.2	$ 143.64	$ 135.58	$ 143.64	$ 135.58	$ 156.2
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	209839	209840	209841	210127	210271	210128	210129	210272	210273	210559
Upgrade Package List	Pkg4331303034	Pkg4331303034	Pkg4331303034	Pkg4331403034	Pkg4341302034	Pkg4331403034	Pkg4331403034	Pkg4341302034	Pkg4341302034	Pkg4341402034
GHGI [kg/m2]	3.44	3.21	3.05	3.44	3.44	3.21	3.05	3.21	3.05	3.44
% ICC	4.9%	5.0%	5.0%	4.9%	4.9%	5.0%	5.1%	5.0%	5.1%	5.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Output: MEUI [kWh/(m2 * yr)]	29.8	28.5	27.6	29.8	29.6	28.5	27.6	28.3	27.5	29.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2719	2720	2720	2719	2688	2720	2720	2689	2689	2688
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 383.35	$ 383.45	$ 383.52	$ 383.35	$ 379.04	$ 383.45	$ 383.52	$ 379.13	$ 379.21	$ 379.04
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.36	$ 1.36	$ 1.36	$ 1.34	$ 1.36	$ 1.36	$ 1.34	$ 1.34	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 384.71	$ 384.81	$ 384.88	$ 384.71	$ 380.38	$ 384.81	$ 384.88	$ 380.48	$ 380.55	$ 380.38
Annual savings in GHG from electricity savings [kg CO2e/year]	29.9	29.9	29.9	29.9	29.6	29.9	29.9	29.6	29.6	29.6
Annual savings in natural gas [m3/year]	79.01	80.09	80.79	79.01	79.01	80.09	80.79	80.09	80.79	79.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 742.05	$ 748.51	$ 732.	$ 732.	$ 742.05	$ 748.51	$ 742.05	$ 748.51	$ 732.
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 185.21	$ 186.82	$ 182.7	$ 182.7	$ 185.21	$ 186.82	$ 185.21	$ 186.82	$ 182.7
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 927.26	$ 935.33	$ 914.71	$ 914.71	$ 927.26	$ 935.33	$ 927.26	$ 935.33	$ 914.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4115.8	4151.6	4060.1	4060.1	4115.8	4151.6	4115.8	4151.6	4060.1
Net Present Value [$]	$ 14,614.19	$ 14,922.16	$ 15,066.68	$ 14,910.59	$ 14,972.81	$ 15,218.56	$ 15,363.08	$ 15,280.6	$ 15,425.31	$ 15,269.21
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	10.51	14.09	14.09	10.51	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 787.	$ 1,860.71	$ 787.	$ 787.	$ 1,860.71	$ 1,860.71	$ 1,860.71
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 2,214.76	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

MEDIUM 50SAR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 25,376.48	$ 25,672.88	$ 25,926.48	$ 25,813.8	$ 26,226.48	$ 26,222.88	$ 26,110.2	$ 26,363.8	$ 26,522.88	$ 26,663.8
ICC with multiplier (Van=1.0,this Cz =1)	$ 25,376.48	$ 25,672.88	$ 25,926.48	$ 25,813.8	$ 26,226.48	$ 26,222.88	$ 26,110.2	$ 26,363.8	$ 26,522.88	$ 26,663.8
Net Present Value [$]	$ 14,614.19	$ 14,910.59	$ 14,922.16	$ 14,972.81	$ 15,066.68	$ 15,218.56	$ 15,269.21	$ 15,280.6	$ 15,363.08	$ 15,425.31
Incremental dollars per GHG saving	$ 6.3	$ 6.37	$ 6.35	$ 6.41	$ 6.36	$ 6.42	$ 6.48	$ 6.45	$ 6.44	$ 6.47
Auxiliary Energy Required Heating [GJ/yr]	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	13.5	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	8.8	8.8	8.8	8.7	8.8	8.8	8.7	8.7	8.8	8.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	50.9	50.9	49.8	50.7	49.1	49.8	50.7	49.7	49.1	49
Design Heating Load [W]	6362.8	6362.8	6362.8	6337.6	6362.8	6362.8	6337.6	6337.6	6362.8	6337.6
Annual Energy Electricity [kWh/yr]	10380.7	10380.7	10381.4	10350.1	10381.9	10381.4	10350.1	10350.8	10381.9	10351.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,405.55	$ 1,405.55	$ 1,405.65	$ 1,401.22	$ 1,405.72	$ 1,405.65	$ 1,401.22	$ 1,401.32	$ 1,405.72	$ 1,401.39
Annual Energy Natural Gas [m3/yr]	362.1	362.1	333	362.1	314.3	333	362.1	333	314.3	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 156.2	$ 143.64	$ 135.58	$ 135.58
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	209839	210127	209840	210271	209841	210128	210559	210272	210129	210273
Upgrade Package List	Pkg4331303034	Pkg4331403034	Pkg4331303034	Pkg4341302034	Pkg4331303034	Pkg4331403034	Pkg4341402034	Pkg4341302034	Pkg4331403034	Pkg4341302034
GHGI [kg/m2]	3.44	3.44	3.21	3.44	3.05	3.21	3.44	3.21	3.05	3.05
% ICC	4.9%	4.9%	5.0%	4.9%	5.0%	5.0%	5.0%	5.0%	5.1%	5.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Output: MEUI [kWh/(m2 * yr)]	29.8	29.8	28.5	29.6	27.6	28.5	29.6	28.3	27.6	27.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%	5030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2719	2719	2720	2688	2720	2720	2688	2689	2720	2689
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 383.35	$ 383.35	$ 383.45	$ 379.04	$ 383.52	$ 383.45	$ 379.04	$ 379.13	$ 383.52	$ 379.21
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.36	$ 1.36	$ 1.34	$ 1.36	$ 1.36	$ 1.34	$ 1.34	$ 1.36	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 384.71	$ 384.71	$ 384.81	$ 380.38	$ 384.88	$ 384.81	$ 380.38	$ 380.48	$ 384.88	$ 380.55
Annual savings in GHG from electricity savings [kg CO2e/year]	29.9	29.9	29.9	29.6	29.9	29.9	29.6	29.6	29.9	29.6
Annual savings in natural gas [m3/year]	79.01	79.01	80.09	79.01	80.79	80.09	79.01	80.09	80.79	80.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 732.	$ 732.	$ 742.05	$ 732.	$ 748.51	$ 742.05	$ 732.	$ 742.05	$ 748.51	$ 748.51
Annual savings in carbon tax for natural gas [$/year]	$ 182.7	$ 182.7	$ 185.21	$ 182.7	$ 186.82	$ 185.21	$ 182.7	$ 185.21	$ 186.82	$ 186.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 914.71	$ 914.71	$ 927.26	$ 914.71	$ 935.33	$ 927.26	$ 914.71	$ 927.26	$ 935.33	$ 935.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	4060.1	4060.1	4115.8	4060.1	4151.6	4115.8	4060.1	4115.8	4151.6	4151.6
Net Present Value [$]	$ 14,614.19	$ 14,910.59	$ 14,922.16	$ 14,972.81	$ 15,066.68	$ 15,218.56	$ 15,269.21	$ 15,280.6	$ 15,363.08	$ 15,425.31
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	10.51	14.09	14.09	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 1,860.71	$ 787.	$ 787.	$ 1,860.71	$ 1,860.71	$ 787.	$ 1,860.71
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 2,214.76	$ 1,918.36	$ 2,214.76	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$ 850.

MEDIUM 50SAR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,731.11	$ 13,951.72	$ 14,231.11	$ 14,281.11	$ 14,331.11	$ 14,451.72	$ 14,472.31	$ 14,501.72	$ 14,551.72	$ 14,581.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 14,733.48	$ 14,970.2	$ 15,269.98	$ 15,323.63	$ 15,377.28	$ 15,506.7	$ 15,528.79	$ 15,560.35	$ 15,614.	$ 15,645.53
Net Present Value [$]	$ 13,162.36	$ 13,296.61	$ 12,477.93	$ 13,426.04	$ 11,984.03	$ 12,880.03	$ 13,175.96	$ 13,561.01	$ 12,104.22	$ 13,542.6
Incremental dollars per GHG saving	$ 3.35	$ 3.4	$ 3.47	$ 3.43	$ 3.1	$ 3.52	$ 3.53	$ 3.48	$ 3.15	$ 3.47
Auxiliary Energy Required Heating [GJ/yr]	52	51.6	49	52	53.7	48.6	52.7	51.6	53.3	52
Annual Energy DHW [GJ/yr]	23.6	23.6	23.6	22.4	13.5	23.6	23.7	22.4	13.5	21.5
Annual Energy Space Heating [GJ/yr]	21.7	21.6	20	21.7	22.4	20.3	21.7	21.6	22.3	21.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	76.2	76.1	74.5	74.9	66.8	74.8	75.3	74.8	66.6	74.1
Design Heating Load [W]	11540.1	11470.8	10948	11540.1	11346.2	10878.7	10948	11470.8	11276.9	11540.1
Annual Energy Electricity [kWh/yr]	14602	14568.4	14142.2	14602	14798.5	14212.4	14311.9	14568.4	14759.5	14602
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,002.87	$ 1,998.11	$ 1,937.81	$ 2,002.87	$ 2,030.67	$ 1,947.74	$ 1,961.82	$ 1,998.11	$ 2,025.15	$ 2,002.87
Annual Energy Natural Gas [m3/yr]	634.8	634.8	634.7	600.6	362.1	634.8	637.1	600.7	362.1	578.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 273.83	$ 273.83	$ 273.79	$ 259.08	$ 156.2	$ 273.83	$ 274.82	$ 259.12	$ 156.2	$ 249.63
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	159850	160120	169570	159851	159853	169840	169516	160121	160123	159852
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg2121102031	Pkg2121101021	Pkg1121102031	Pkg1121102031	Pkg1121101031
GHGI [kg/m2]	5.87	5.87	5.85	5.59	3.65	5.85	5.88	5.59	3.65	5.41
% ICC	2.6%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	61.6	61.1	58.1	61.6	63.6	57.6	62.4	61.1	63.2	61.6
Output: MEUI [kWh/(m2 * yr)]	59.1	58.9	57.1	57.6	47.9	57.4	58.2	57.4	47.7	56.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1360.0%	1430.0%	1860.0%	1360.0%	1080.0%	1930.0%	1250.0%	1430.0%	1150.0%	1360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6872	6839	6412	6872	7069	6483	6582	6839	7030	6872
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 968.99	$ 964.26	$ 904.16	$ 968.99	$ 996.7	$ 914.06	$ 928.09	$ 964.26	$ 991.2	$ 968.99
Annual savings in carbon tax for electricity [$/year]	$ 3.44	$ 3.42	$ 3.21	$ 3.44	$ 3.53	$ 3.24	$ 3.29	$ 3.42	$ 3.51	$ 3.44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 972.43	$ 967.68	$ 907.37	$ 972.43	$ 1,000.24	$ 917.3	$ 931.38	$ 967.68	$ 994.72	$ 972.43
Annual savings in GHG from electricity savings [kg CO2e/year]	75.6	75.2	70.5	75.6	77.8	71.3	72.4	75.2	77.3	75.6
Annual savings in natural gas [m3/year]	81.23	81.23	81.23	82.5	91.39	81.23	81.14	82.5	91.39	83.32
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 752.58	$ 752.58	$ 752.61	$ 764.38	$ 846.72	$ 752.58	$ 751.79	$ 764.35	$ 846.72	$ 771.94
Annual savings in carbon tax for natural gas [$/year]	$ 187.84	$ 187.84	$ 187.85	$ 190.79	$ 211.34	$ 187.84	$ 187.64	$ 190.78	$ 211.34	$ 192.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 940.42	$ 940.42	$ 940.46	$ 955.17	$ 1,058.05	$ 940.42	$ 939.43	$ 955.13	$ 1,058.05	$ 964.62
Annual savings in GHG from natural gas savings [kg CO2e/year]	4174.2	4174.2	4174.4	4239.7	4696.4	4174.2	4169.8	4239.5	4696.4	4281.6
Net Present Value [$]	$ 13,162.36	$ 13,296.61	$ 12,477.93	$ 13,426.04	$ 11,984.03	$ 12,880.03	$ 13,175.96	$ 13,561.01	$ 12,104.22	$ 13,542.6
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$.	$ 850.

MEDIUM 50SAR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,605.11	$ 15,825.72	$ 16,155.11	$ 16,375.72	$ 14,331.11	$ 16,455.11	$ 14,551.72	$ 16,675.72	$ 14,881.11	$ 14,831.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 16,744.28	$ 16,981.	$ 17,334.43	$ 17,571.15	$ 15,377.28	$ 17,656.33	$ 15,614.	$ 17,893.05	$ 15,967.43	$ 15,913.78
Net Present Value [$]	$ 15,804.09	$ 16,110.69	$ 15,818.75	$ 16,203.5	$ 11,984.03	$ 15,825.15	$ 12,104.22	$ 16,209.36	$ 12,291.46	$ 11,484.93
Incremental dollars per GHG saving	$ 2.95	$ 2.99	$ 3.05	$ 3.1	$ 3.1	$ 3.11	$ 3.15	$ 3.15	$ 3.18	$ 3.21
Auxiliary Energy Required Heating [GJ/yr]	54.1	53.7	53.8	53.4	53.7	53.7	53.3	53.3	53.7	50.7
Annual Energy DHW [Gj/yr]	7.8	7.8	7.3	7.3	13.5	6.9	13.5	6.9	12.4	13.5
Annual Energy Space Heating [GJ/yr]	22.4	22.6	22.2	22.5	22.4	22.2	22.3	22.4	22.4	21
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Energy [GJ/yr]	61.1	61.2	60.3	60.6	66.8	59.9	66.6	60.1	65.7	65.4
Design Heating Load [W]	10948	10878.7	10948	10878.7	11346.2	10948	11276.9	10878.7	11346.2	10757.5
Annual Energy Electricity [kWh/yr]	16965.5	16998.9	16757.6	16821.3	14798.5	16643.5	14759.5	16707.1	14799.3	14410.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,337.3	$ 2,342.03	$ 2,307.89	$ 2,316.9	$ 2,030.67	$ 2,291.74	$ 2,025.15	$ 2,300.74	$ 2,030.79	$ 1,975.76
Annual Energy Natural Gas [m3/yr]	0	0	0	0	362.1	0	362.1	0	332.9	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$ 156.2	$.	$ 156.2	$.	$ 143.6	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169576	169846	169577	169847	159853	169578	160123	169848	159854	169573
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg1121101031	Pkg2121101031	Pkg1121102031	Pkg2121102031	Pkg1121101031	Pkg2121101031
GHGI [kg/m2]	0.8	0.8	0.79	0.79	3.65	0.79	3.65	0.78	3.41	3.63
% ICC	3.0%	3.0%	3.1%	3.1%	2.7%	3.1%	2.8%	3.2%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.1	63.6	63.8	63.3	63.6	63.6	63.2	63.2	63.6	60.1
Output: MEUI [kWh/(m2 * yr)]	41.1	41.3	40.2	40.5	47.9	39.8	47.7	40	46.6	46.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1010.0%	1080.0%	1060.0%	1130.0%	1080.0%	1080.0%	1150.0%	1150.0%	1080.0%	1580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9236	9269	9028	9092	7069	8914	7030	8977	7070	6681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,302.25	$ 1,306.96	$ 1,272.93	$ 1,281.92	$ 996.7	$ 1,256.85	$ 991.2	$ 1,265.81	$ 996.81	$ 941.98
Annual savings in carbon tax for electricity [$/year]	$ 4.62	$ 4.63	$ 4.51	$ 4.55	$ 3.53	$ 4.46	$ 3.51	$ 4.49	$ 3.53	$ 3.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,306.87	$ 1,311.59	$ 1,277.45	$ 1,286.46	$ 1,000.24	$ 1,261.3	$ 994.72	$ 1,270.3	$ 1,000.35	$ 945.32
Annual savings in GHG from electricity savings [kg CO2e/year]	101.6	102	99.3	100	77.8	98.1	77.3	98.8	77.8	73.5
Annual savings in natural gas [m3/year]	104.88	104.88	104.88	104.88	91.39	104.88	91.39	104.88	92.48	91.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 846.72	$ 971.71	$ 846.72	$ 971.71	$ 856.8	$ 846.72
Annual savings in carbon tax for natural gas [$/year]	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 211.34	$ 242.54	$ 211.34	$ 242.54	$ 213.85	$ 211.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,058.05	$ 1,214.25	$ 1,058.05	$ 1,214.25	$ 1,070.65	$ 1,058.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	5389.7	5389.7	5389.7	5389.7	4696.4	5389.7	4696.4	5389.7	4752.3	4696.4
Net Present Value [$]	$ 15,804.09	$ 16,110.69	$ 15,818.75	$ 16,203.5	$ 11,984.03	$ 15,825.15	$ 12,104.22	$ 16,209.36	$ 12,291.46	$ 11,484.93
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$.	$ 850.	$ 550.	$.

MEDIUM 50SAR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 19,896.41	$ 20,117.02	$ 19,896.41	$ 19,946.41	$ 20,006.41	$ 20,117.02	$ 20,167.02	$ 20,396.41	$ 20,246.41	$ 20,027.02
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,348.85	$ 21,585.56	$ 21,348.85	$ 21,402.5	$ 21,466.88	$ 21,585.56	$ 21,639.21	$ 21,885.35	$ 21,724.4	$ 21,488.99
Net Present Value [$]	$ 8,089.97	$ 8,215.69	$ 8,227.27	$ 8,249.04	$ 8,274.28	$ 8,352.26	$ 8,373.85	$ 8,377.32	$ 8,393.27	$ 8,396.48
Incremental dollars per GHG saving	$ 7.29	$ 7.31	$ 7.37	$ 7.36	$ 7.36	$ 7.39	$ 7.38	$ 7.35	$ 7.37	$ 7.42
Auxiliary Energy Required Heating [GJ/yr]	36.7	36.4	37.3	38.2	38	36.9	37.8	35.9	38.2	39.1
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	12.4	13.5	12.4	13.5	11.7	11.7
Annual Energy Space Heating [GJ/yr]	38.9	38.5	39.5	40.4	40.3	39.1	40	38	40.4	41.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	79.7	79.3	80.3	80.1	80	79.9	79.7	78.8	79.5	80.4
Design Heating Load [W]	8436.7	8367.4	8697.6	8726.8	8572.9	8628.3	8657.5	8407.5	8726.8	8793.6
Annual Energy Electricity [kWh/yr]	7785.6	7783.6	7788.5	7793.2	7792.4	7786.5	7791.1	7781.1	7793.2	7797.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,038.35	$ 1,038.06	$ 1,038.76	$ 1,039.42	$ 1,039.31	$ 1,038.47	$ 1,039.13	$ 1,037.71	$ 1,039.42	$ 1,040.09
Annual Energy Natural Gas [m3/yr]	1388.2	1377.5	1403.7	1398.9	1395	1392.9	1388.1	1364.2	1380.3	1405.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 598.82	$ 594.21	$ 605.51	$ 603.44	$ 601.75	$ 600.85	$ 598.78	$ 588.47	$ 595.41	$ 606.24
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	201550	201766	186016	185999	201533	186232	186215	201568	186000	186198
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg2321201034	Pkg2321201033	Pkg3321201032	Pkg2321202034	Pkg2321202033	Pkg3321201034	Pkg2321201033	Pkg2321202032
GHGI [kg/m2]	11.7	11.62	11.83	11.79	11.76	11.74	11.7	11.51	11.64	11.85
% ICC	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	3.9%	3.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.5	43.1	44.2	45.2	45.1	43.7	44.8	42.5	45.2	46.3
Output: MEUI [kWh/(m2 * yr)]	64.1	63.6	64.8	64.6	64.4	64.3	64.1	63	63.8	64.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	3900.0%	3950.0%	3800.0%	3650.0%	3690.0%	3870.0%	3720.0%	4040.0%	3650.0%	3500.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	56	54	59	64	63	57	61	51	64	68
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7.88	$ 7.6	$ 8.29	$ 8.95	$ 8.84	$ 8.01	$ 8.66	$ 7.25	$ 8.95	$ 9.62
Annual savings in carbon tax for electricity [$/year]	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03	$ .03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7.91	$ 7.63	$ 8.32	$ 8.99	$ 8.87	$ 8.04	$ 8.69	$ 7.27	$ 8.99	$ 9.65
Annual savings in GHG from electricity savings [kg CO2e/year]	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.6	0.7	0.8
Annual savings in natural gas [m3/year]	53.16	53.56	52.58	52.76	52.9	52.98	53.16	54.05	53.45	52.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 492.5	$ 496.2	$ 487.15	$ 488.81	$ 490.16	$ 490.88	$ 492.54	$ 500.79	$ 495.23	$ 486.56
Annual savings in carbon tax for natural gas [$/year]	$ 122.93	$ 123.85	$ 121.59	$ 122.	$ 122.34	$ 122.52	$ 122.93	$ 124.99	$ 123.61	$ 121.44
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 615.43	$ 620.04	$ 608.74	$ 610.81	$ 612.5	$ 613.4	$ 615.47	$ 625.78	$ 618.84	$ 608.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	2731.7	2752.2	2702	2711.2	2718.7	2722.7	2731.9	2777.6	2746.8	2698.8
Net Present Value [$]	$ 8,089.97	$ 8,215.69	$ 8,227.27	$ 8,249.04	$ 8,274.28	$ 8,352.26	$ 8,373.85	$ 8,377.32	$ 8,393.27	$ 8,396.48
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$ 550.	$.	$ 850.	$ 850.

MEDIUM 50SAR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,631.11	$ 16,851.72	$ 16,905.91	$ 17,053.34	$ 17,126.52	$ 17,181.11	$ 17,367.72	$ 17,401.72	$ 17,455.91	$ 17,481.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,845.18	$ 18,081.9	$ 18,140.04	$ 18,298.23	$ 18,376.76	$ 18,435.33	$ 18,635.56	$ 18,672.05	$ 18,730.19	$ 18,757.23
Net Present Value [$]	$ 13,225.77	$ 13,359.84	$ 13,549.29	$ 14,806.68	$ 13,669.84	$ 13,533.38	$ 14,103.58	$ 13,667.26	$ 13,812.73	$ 13,678.15
Incremental dollars per GHG saving	$ 3.6	$ 3.65	$ 4.12	$ 4.05	$ 4.17	$ 3.67	$ 4.23	$ 3.72	$ 4.18	$ 3.71
Auxiliary Energy Required Heating [GJ/yr]	48	47.6	43.1	47.9	42.7	48	46.2	47.6	43.1	48
Annual Energy DHW [GJ/yr]	13.5	13.5	23.7	21.5	23.7	12.4	23.7	12.4	22.4	11.7
Annual Energy Space Heating [GJ/yr]	19.9	19.8	17.8	20	17.6	19.9	19	19.8	17.8	19.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	0.7	0.7	0.7	1.7	0.7	1.7	0.7	1.7
Total Energy [GJ/yr]	65.3	65.2	72.3	72.4	72.2	64.2	72.5	64.1	71.1	63.5
Design Heating Load [W]	10086.4	10017.1	10177	10780	10107.7	10086.4	10107.7	10017.1	10177	10086.4
Annual Energy Electricity [kWh/yr]	14387.4	14353.8	13514.2	14134.4	13475.3	14388.3	13546.2	14354.6	13514.2	14388.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,972.5	$ 1,967.75	$ 1,848.94	$ 1,936.7	$ 1,843.44	$ 1,972.63	$ 1,853.47	$ 1,967.86	$ 1,848.94	$ 1,972.7
Annual Energy Natural Gas [m3/yr]	362.1	362.1	636.3	578.2	636.3	332.9	637.5	332.9	602.1	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 274.48	$ 249.42	$ 274.48	$ 143.6	$ 275.	$ 143.6	$ 259.72	$ 135.53
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	169609	169879	175942	171462	176212	169610	176158	169880	175943	169611
Upgrade Package List	Pkg2121101033	Pkg2121102033	Pkg2221101031	Pkg2131102031	Pkg2221102031	Pkg2121101033	Pkg2221102021	Pkg2121102033	Pkg2221101031	Pkg2121101033
GHGI [kg/m2]	3.63	3.63	5.83	5.39	5.83	3.39	5.84	3.39	5.55	3.24
% ICC	3.2%	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.9	56.4	51	56.7	50.6	56.9	54.7	56.4	51	56.9
Output: MEUI [kWh/(m2 * yr)]	46.1	46	54.5	54.6	54.3	44.8	55	44.7	53	44
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2030.0%	2090.0%	2840.0%	2040.0%	2910.0%	2030.0%	2330.0%	2090.0%	2840.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6658	6624	5784	6405	5746	6659	5816	6625	5784	6659
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 938.74	$ 934.	$ 815.61	$ 903.06	$ 810.13	$ 938.86	$ 820.13	$ 934.11	$ 815.61	$ 938.93
Annual savings in carbon tax for electricity [$/year]	$ 3.33	$ 3.31	$ 2.89	$ 3.2	$ 2.87	$ 3.33	$ 2.91	$ 3.31	$ 2.89	$ 3.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 942.06	$ 937.31	$ 818.51	$ 906.27	$ 813.	$ 942.19	$ 823.03	$ 937.42	$ 818.51	$ 942.26
Annual savings in GHG from electricity savings [kg CO2e/year]	73.2	72.9	63.6	70.5	63.2	73.2	64	72.9	63.6	73.3
Annual savings in natural gas [m3/year]	91.39	91.39	81.17	83.34	81.17	92.48	81.13	92.48	82.45	93.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 846.72	$ 846.72	$ 752.06	$ 772.12	$ 752.06	$ 856.8	$ 751.65	$ 856.8	$ 763.87	$ 863.25
Annual savings in carbon tax for natural gas [$/year]	$ 211.34	$ 211.34	$ 187.71	$ 192.72	$ 187.71	$ 213.85	$ 187.61	$ 213.85	$ 190.66	$ 215.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,058.05	$ 1,058.05	$ 939.77	$ 964.83	$ 939.77	$ 1,070.65	$ 939.25	$ 1,070.65	$ 954.52	$ 1,078.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	4696.4	4696.4	4171.4	4282.6	4171.4	4752.3	4169.1	4752.3	4236.8	4788.1
Net Present Value [$]	$ 13,225.77	$ 13,359.84	$ 13,549.29	$ 14,806.68	$ 13,669.84	$ 13,533.38	$ 14,103.58	$ 13,667.26	$ 13,812.73	$ 13,678.15
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	10.51	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	5.28	3.87	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 3,026.61	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	NA	NA	NA	HRV sre 75	NA	HRV sre 75	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$.	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$.	$ 550.	$.	$ 550.	$ 550.	$ 850.

MEDIUM 50SAR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,279.91	$ 18,500.52	$ 18,829.91	$ 19,050.52	$ 16,631.11	$ 19,129.91	$ 16,851.72	$ 19,350.52	$ 17,181.11	$ 17,481.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 19,614.34	$ 19,851.06	$ 20,204.49	$ 20,441.21	$ 17,845.18	$ 20,526.39	$ 18,081.9	$ 20,763.11	$ 18,435.33	$ 18,757.23
Net Present Value [$]	$ 16,677.32	$ 16,797.51	$ 16,771.59	$ 16,891.59	$ 13,225.77	$ 16,777.99	$ 13,359.84	$ 16,898.	$ 13,533.38	$ 13,678.15
Incremental dollars per GHG saving	$ 3.45	$ 3.49	$ 3.55	$ 3.6	$ 3.6	$ 3.61	$ 3.65	$ 3.65	$ 3.67	$ 3.71
Auxiliary Energy Required Heating [GJ/yr]	48	47.6	47.8	47.4	48	47.6	47.6	47.2	48	48
Annual Energy DHW [GJ/yr]	7.8	7.8	7.3	7.3	13.5	6.9	13.5	6.9	12.4	11.7
Annual Energy Space Heating [GJ/yr]	20	19.8	19.9	19.8	19.9	19.8	19.8	19.7	19.9	19.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	1.7	0.7	1.7	0.7	1.7	1.7
Total Energy [GJ/yr]	58.6	58.4	57.9	57.8	65.3	57.5	65.2	57.4	64.2	63.5
Design Heating Load [W]	10177	10107.7	10177	10107.7	10086.4	10177	10017.1	10107.7	10086.4	10086.4
Annual Energy Electricity [kWh/yr]	16265.7	16226.7	16088.7	16049.6	14387.4	15974.7	14353.8	15935.6	14388.3	14388.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,238.28	$ 2,232.76	$ 2,213.24	$ 2,207.7	$ 1,972.5	$ 2,197.11	$ 1,967.75	$ 2,191.57	$ 1,972.63	$ 1,972.7
Annual Energy Natural Gas [m3/yr]	0	0	0	0	362.1	0	362.1	0	332.9	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$ 156.2	$.	$ 156.2	$.	$ 143.6	$ 135.53
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175948	176218	175949	176219	169609	175950	169879	176220	169610	169611
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221102031	Pkg2121101033	Pkg2221101031	Pkg2121102033	Pkg2221102031	Pkg2121101033	Pkg2121101033
GHGI [kg/m2]	0.76	0.76	0.76	0.75	3.63	0.75	3.63	0.75	3.39	3.24
% ICC	3.5%	3.5%	3.6%	3.6%	3.2%	3.7%	3.2%	3.7%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	56.9	56.4	56.6	56.2	56.9	56.5	56.4	56	56.9	56.9
Output: MEUI [kWh/(m2 * yr)]	38.2	38	37.4	37.2	46.1	36.9	46	36.8	44.8	44
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2030.0%	2090.0%	2060.0%	2130.0%	2030.0%	2090.0%	2090.0%	2160.0%	2030.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8536	8497	8359	8320	6658	8245	6624	8206	6659	6659
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,203.58	$ 1,198.08	$ 1,178.62	$ 1,173.11	$ 938.74	$ 1,162.54	$ 934.	$ 1,157.03	$ 938.86	$ 938.93
Annual savings in carbon tax for electricity [$/year]	$ 4.27	$ 4.25	$ 4.18	$ 4.16	$ 3.33	$ 4.12	$ 3.31	$ 4.1	$ 3.33	$ 3.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,207.84	$ 1,202.33	$ 1,182.8	$ 1,177.27	$ 942.06	$ 1,166.67	$ 937.31	$ 1,161.13	$ 942.19	$ 942.26
Annual savings in GHG from electricity savings [kg CO2e/year]	93.9	93.5	91.9	91.5	73.2	90.7	72.9	90.3	73.2	73.3
Annual savings in natural gas [m3/year]	104.88	104.88	104.88	104.88	91.39	104.88	91.39	104.88	92.48	93.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 846.72	$ 971.71	$ 846.72	$ 971.71	$ 856.8	$ 863.25
Annual savings in carbon tax for natural gas [$/year]	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 211.34	$ 242.54	$ 211.34	$ 242.54	$ 213.85	$ 215.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,058.05	$ 1,214.25	$ 1,058.05	$ 1,214.25	$ 1,070.65	$ 1,078.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	5389.7	5389.7	5389.7	5389.7	4696.4	5389.7	4696.4	5389.7	4752.3	4788.1
Net Present Value [$]	$ 16,677.32	$ 16,797.51	$ 16,771.59	$ 16,891.59	$ 13,225.77	$ 16,777.99	$ 13,359.84	$ 16,898.	$ 13,533.38	$ 13,678.15
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	5.28	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 75	NA	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$.	$ 850.	$ 550.	$ 850.

MEDIUM 50SAR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 17,505.91	$ 17,726.52	$ 18,055.91	$ 18,355.91	$ 18,276.52	$ 17,967.72	$ 18,576.52	$ 16,631.11	$ 18,517.72	$ 16,851.72
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,783.84	$ 19,020.56	$ 19,373.99	$ 19,695.89	$ 19,610.71	$ 19,279.36	$ 19,932.61	$ 17,845.18	$ 19,869.51	$ 18,081.9
Net Present Value [$]	$ 12,412.94	$ 12,575.3	$ 12,720.36	$ 12,865.5	$ 12,882.91	$ 12,941.21	$ 13,027.86	$ 13,225.77	$ 13,248.81	$ 13,359.84
Incremental dollars per GHG saving	$ 3.78	$ 3.83	$ 3.85	$ 3.89	$ 3.9	$ 3.88	$ 3.93	$ 3.6	$ 3.95	$ 3.65
Auxiliary Energy Required Heating [GJ/yr]	44.7	44.3	44.7	44.7	44.3	47.9	44.3	48	47.9	47.6
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	11.7	12.4	13.5	11.7	13.5	12.4	13.5
Annual Energy Space Heating [GJ/yr]	18.6	18.6	18.6	18.7	18.6	19.8	18.6	19.9	19.8	19.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.7	0.7	1.7
Total Energy [GJ/yr]	62.9	62.8	61.8	61.1	61.8	63	61.1	65.3	61.9	65.2
Design Heating Load [W]	9986.5	9917.2	9986.5	9986.5	9917.2	9917.2	9917.2	10086.4	9917.2	10017.1
Annual Energy Electricity [kWh/yr]	13731.9	13709.3	13732.7	13733.3	13710.1	13757.7	13710.7	14387.4	13758.6	14353.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,879.75	$ 1,876.55	$ 1,879.86	$ 1,879.95	$ 1,876.66	$ 1,883.4	$ 1,876.75	$ 1,972.5	$ 1,883.53	$ 1,967.75
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	314.2	332.9	362.1	314.2	362.1	332.9	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 135.53	$ 143.6	$ 156.2	$ 135.53	$ 156.2	$ 143.6	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175945	176215	175946	175947	176216	176161	176217	169609	176162	169879
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102021	Pkg2221102031	Pkg2121101033	Pkg2221102021	Pkg2121102033
GHGI [kg/m2]	3.6	3.6	3.36	3.21	3.36	3.6	3.21	3.63	3.36	3.63
% ICC	3.3%	3.4%	3.5%	3.5%	3.5%	3.4%	3.6%	3.2%	3.5%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53	52.5	53	53	52.6	56.8	52.6	56.9	56.8	56.4
Output: MEUI [kWh/(m2 * yr)]	43.3	43.2	42	41.2	42	43.7	41.1	46.1	42.4	46
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2570.0%	2640.0%	2570.0%	2570.0%	2640.0%	2040.0%	2640.0%	2030.0%	2040.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6002	5980	6003	6004	5980	6028	5981	6658	6029	6624
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 846.31	$ 843.12	$ 846.42	$ 846.51	$ 843.24	$ 849.95	$ 843.32	$ 938.74	$ 850.07	$ 934.
Annual savings in carbon tax for electricity [$/year]	$ 3.	$ 2.99	$ 3.	$ 3.	$ 2.99	$ 3.01	$ 2.99	$ 3.33	$ 3.01	$ 3.31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 849.31	$ 846.11	$ 849.42	$ 849.51	$ 846.23	$ 852.96	$ 846.31	$ 942.06	$ 853.09	$ 937.31
Annual savings in GHG from electricity savings [kg CO2e/year]	66	65.8	66	66	65.8	66.3	65.8	73.2	66.3	72.9
Annual savings in natural gas [m3/year]	91.39	91.39	92.48	93.17	92.48	91.39	93.17	91.39	92.48	91.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 846.72	$ 846.72	$ 856.8	$ 863.25	$ 856.8	$ 846.72	$ 863.25	$ 846.72	$ 856.8	$ 846.72
Annual savings in carbon tax for natural gas [$/year]	$ 211.34	$ 211.34	$ 213.85	$ 215.46	$ 213.85	$ 211.34	$ 215.46	$ 211.34	$ 213.85	$ 211.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,058.05	$ 1,058.05	$ 1,070.65	$ 1,078.71	$ 1,070.65	$ 1,058.05	$ 1,078.71	$ 1,058.05	$ 1,070.65	$ 1,058.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	4696.4	4696.4	4752.3	4788.1	4752.3	4696.4	4788.1	4696.4	4752.3	4696.4
Net Present Value [$]	$ 12,412.94	$ 12,575.3	$ 12,720.36	$ 12,865.5	$ 12,882.91	$ 12,941.21	$ 13,027.86	$ 13,225.77	$ 13,248.81	$ 13,359.84
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	10.51	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 5,758.25	$ 8,433.05	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$.	$ 550.	$.

MEDIUM 50SAR Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 34,937.52	$ 35,216.91	$ 35,398.58	$ 35,437.52	$ 35,573.91	$ 35,677.97	$ 35,694.98	$ 35,898.58	$ 35,974.37	$ 36,034.97
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 37,487.96	$ 37,787.74	$ 37,982.68	$ 38,024.46	$ 38,170.81	$ 38,282.46	$ 38,300.71	$ 38,519.18	$ 38,600.5	$ 38,665.52
Net Present Value [$]	$ 25,629.44	$ 25,791.61	$ 26,090.5	$ 25,912.71	$ 26,155.36	$ 26,252.67	$ 26,386.9	$ 26,373.77	$ 26,549.07	$ 26,616.42
Incremental dollars per GHG saving	$ 7.37	$ 7.43	$ 7.47	$ 7.48	$ 7.51	$ 7.53	$ 7.53	$ 7.58	$ 7.59	$ 7.6
Auxiliary Energy Required Heating [GJ/yr]	29.3	28.8	29.3	28.4	28.8	28.8	29.3	28.4	28.8	28.8
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	12.2	12	12.2	11.9	12.1	12	12.2	11.9	12	12.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	55.8	55.6	55.8	55.5	55.6	55.6	55.8	55.5	55.6	55.6
Design Heating Load [W]	7500.4	7540.6	7500.4	7471.3	7459.7	7540.6	7500.4	7471.3	7540.6	7459.7
Annual Energy Electricity [kWh/yr]	12250.4	12204.9	12250.4	12166.2	12207.5	12204.9	12250.4	12166.2	12204.9	12207.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,670.12	$ 1,663.68	$ 1,670.12	$ 1,658.2	$ 1,664.05	$ 1,663.68	$ 1,670.12	$ 1,658.2	$ 1,663.68	$ 1,664.05
Annual Energy Natural Gas [m3/yr]	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	201885	201687	202533	201903	202101	202335	203181	202551	202983	202749
Upgrade Package List	Pkg3321202053	Pkg3321201054	Pkg3321302053	Pkg3321202054	Pkg3321203053	Pkg3321301054	Pkg3321402053	Pkg3321302054	Pkg3321401054	Pkg3321303053
GHGI [kg/m2]	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
% ICC	6.7%	6.7%	6.8%	6.8%	6.8%	6.8%	6.8%	6.9%	6.9%	6.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	34.7	34.2	34.7	33.7	34.1	34.2	34.7	33.7	34.2	34.1
Output: MEUI [kWh/(m2 * yr)]	34.9	34.7	34.9	34.5	34.7	34.7	34.9	34.5	34.7	34.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5130.0%	5220.0%	5130.0%	5280.0%	5220.0%	5220.0%	5130.0%	5280.0%	5220.0%	5220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4521	4475	4521	4436	4478	4475	4521	4436	4475	4478
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 637.42	$ 631.	$ 637.42	$ 625.55	$ 631.37	$ 631.	$ 637.42	$ 625.55	$ 631.	$ 631.37
Annual savings in carbon tax for electricity [$/year]	$ 2.26	$ 2.24	$ 2.26	$ 2.22	$ 2.24	$ 2.24	$ 2.26	$ 2.22	$ 2.24	$ 2.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 639.68	$ 633.24	$ 639.68	$ 627.76	$ 633.61	$ 633.24	$ 639.68	$ 627.76	$ 633.24	$ 633.61
Annual savings in GHG from electricity savings [kg CO2e/year]	49.7	49.2	49.7	48.8	49.3	49.2	49.7	48.8	49.2	49.3
Annual savings in natural gas [m3/year]	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25
Annual savings in carbon tax for natural gas [$/year]	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1
Net Present Value [$]	$ 25,629.44	$ 25,791.61	$ 26,090.5	$ 25,912.71	$ 26,155.36	$ 26,252.67	$ 26,386.9	$ 26,373.77	$ 26,549.07	$ 26,616.42
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	14.09	8.78	10.51	10.51	8.78	14.09
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60	CeilR50	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 1,162.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 2,214.76	$ 1,918.36	$ 2,214.76	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

MEDIUM 50SAR Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 37,372.58	$ 37,458.97	$ 37,672.58	$ 37,668.98	$ 37,755.37	$ 37,968.98	$ 38,008.97	$ 38,308.97	$ 38,299.53	$ 38,305.37
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 40,100.78	$ 40,193.47	$ 40,422.68	$ 40,418.82	$ 40,511.51	$ 40,740.72	$ 40,783.62	$ 41,105.52	$ 41,095.4	$ 41,101.66
Net Present Value [$]	$ 30,769.54	$ 31,193.89	$ 30,840.76	$ 31,065.94	$ 31,490.29	$ 31,137.16	$ 31,353.71	$ 31,362.48	$ 31,774.08	$ 31,650.11
Incremental dollars per GHG saving	$ 7.03	$ 7.05	$ 7.08	$ 7.08	$ 7.1	$ 7.14	$ 7.15	$ 7.2	$ 7.2	$ 7.2
Auxiliary Energy Required Heating [GJ/yr]	30.1	29.8	29.9	30.1	29.8	29.9	29.6	29.4	30	29.6
Annual Energy DHW [GJ/yr]	7.3	7.8	6.9	7.3	7.8	6.9	7.3	6.9	7.3	7.3
Annual Energy Space Heating [GJ/yr]	12.5	12.4	12.4	12.5	12.4	12.4	12.3	12.3	12.6	12.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	51.6	52	51.2	51.6	52	51.2	51.5	51.1	51.7	51.5
Design Heating Load [W]	7402	7361.3	7402	7402	7361.3	7402	7361.3	7361.3	7514.8	7361.3
Annual Energy Electricity [kWh/yr]	14323.4	14454.7	14234.5	14323.4	14454.7	14234.5	14303.1	14190	14353.5	14303.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,963.45	$ 1,982.03	$ 1,950.87	$ 1,963.45	$ 1,982.03	$ 1,950.87	$ 1,960.57	$ 1,944.57	$ 1,967.71	$ 1,960.57
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	209195	209338	209196	209483	209626	209484	209339	209340	204065	209627
Upgrade Package List	Pkg4321302054	Pkg4321303054	Pkg4321302054	Pkg4321402054	Pkg4321403054	Pkg4321402054	Pkg4321303054	Pkg4321303054	Pkg3331203054	Pkg4321403054
GHGI [kg/m2]	0.67	0.68	0.67	0.67	0.68	0.67	0.67	0.67	0.67	0.67
% ICC	7.1%	7.2%	7.2%	7.2%	7.2%	7.3%	7.3%	7.3%	7.3%	7.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	35.6	35.3	35.5	35.6	35.3	35.5	35	34.9	35.6	35
Output: MEUI [kWh/(m2 * yr)]	29.9	30.4	29.5	29.9	30.4	29.5	29.8	29.3	30	29.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5000.0%	5050.0%	5030.0%	5000.0%	5050.0%	5030.0%	5080.0%	5120.0%	5020.0%	5080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6594	6725	6505	6594	6725	6505	6573	6460	6624	6573
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 929.71	$ 948.22	$ 917.18	$ 929.71	$ 948.22	$ 917.18	$ 926.85	$ 910.9	$ 933.96	$ 926.85
Annual savings in carbon tax for electricity [$/year]	$ 3.3	$ 3.36	$ 3.25	$ 3.3	$ 3.36	$ 3.25	$ 3.29	$ 3.23	$ 3.31	$ 3.29
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 933.01	$ 951.59	$ 920.43	$ 933.01	$ 951.59	$ 920.43	$ 930.14	$ 914.13	$ 937.27	$ 930.14
Annual savings in GHG from electricity savings [kg CO2e/year]	72.5	74	71.6	72.5	74	71.6	72.3	71.1	72.9	72.3
Annual savings in natural gas [m3/year]	104.88	104.88	104.88	104.88	104.88	104.88	104.88	104.88	104.88	104.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71	$ 971.71
Annual savings in carbon tax for natural gas [$/year]	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54	$ 242.54
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25	$ 1,214.25
Annual savings in GHG from natural gas savings [kg CO2e/year]	5389.7	5389.7	5389.7	5389.7	5389.7	5389.7	5389.7	5389.7	5389.7	5389.7
Net Present Value [$]	$ 30,769.54	$ 31,193.89	$ 30,840.76	$ 31,065.94	$ 31,490.29	$ 31,137.16	$ 31,353.71	$ 31,362.48	$ 31,774.08	$ 31,650.11
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	10.51	14.09	10.51	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 1,162.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 3,026.61	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 2,214.76	$ 2,214.76	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.	$ 550.

MEDIUM 50SAR Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 34,937.52	$ 35,216.91	$ 35,437.52	$ 35,398.58	$ 35,573.91	$ 35,677.97	$ 35,898.58	$ 35,694.98	$ 36,073.91	$ 35,974.37
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 37,487.96	$ 37,787.74	$ 38,024.46	$ 37,982.68	$ 38,170.81	$ 38,282.46	$ 38,519.18	$ 38,300.71	$ 38,707.31	$ 38,600.5
Net Present Value [$]	$ 25,629.44	$ 25,791.61	$ 25,912.71	$ 26,090.5	$ 26,155.36	$ 26,252.67	$ 26,373.77	$ 26,386.9	$ 26,437.9	$ 26,549.07
Incremental dollars per GHG saving	$ 7.37	$ 7.43	$ 7.48	$ 7.47	$ 7.51	$ 7.53	$ 7.58	$ 7.53	$ 7.61	$ 7.59
Auxiliary Energy Required Heating [GJ/yr]	29.3	28.8	28.4	29.3	28.8	28.8	28.4	29.3	28	28.8
Annual Energy DHW [GJ/yr]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Annual Energy Space Heating [GJ/yr]	12.2	12	11.9	12.2	12.1	12	11.9	12.2	11.8	12
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	55.8	55.6	55.5	55.8	55.6	55.6	55.5	55.8	55.3	55.6
Design Heating Load [W]	7500.4	7540.6	7471.3	7500.4	7459.7	7540.6	7471.3	7500.4	7430.5	7540.6
Annual Energy Electricity [kWh/yr]	12250.4	12204.9	12166.2	12250.4	12207.5	12204.9	12166.2	12250.4	12123	12204.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,670.12	$ 1,663.68	$ 1,658.2	$ 1,670.12	$ 1,664.05	$ 1,663.68	$ 1,658.2	$ 1,670.12	$ 1,652.09	$ 1,663.68
Annual Energy Natural Gas [m3/yr]	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53	$ 135.53
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	201885	201687	201903	202533	202101	202335	202551	203181	202119	202983
Upgrade Package List	Pkg3321202053	Pkg3321201054	Pkg3321202054	Pkg3321302053	Pkg3321203053	Pkg3321301054	Pkg3321302054	Pkg3321402053	Pkg3321203054	Pkg3321401054
GHGI [kg/m2]	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
% ICC	6.7%	6.7%	6.8%	6.8%	6.8%	6.8%	6.9%	6.8%	6.9%	6.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	34.7	34.2	33.7	34.7	34.1	34.2	33.7	34.7	33.1	34.2
Output: MEUI [kWh/(m2 * yr)]	34.9	34.7	34.5	34.9	34.7	34.7	34.5	34.9	34.4	34.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5130.0%	5220.0%	5280.0%	5130.0%	5220.0%	5220.0%	5280.0%	5130.0%	5350.0%	5220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4521	4475	4436	4521	4478	4475	4436	4521	4393	4475
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 637.42	$ 631.	$ 625.55	$ 637.42	$ 631.37	$ 631.	$ 625.55	$ 637.42	$ 619.46	$ 631.
Annual savings in carbon tax for electricity [$/year]	$ 2.26	$ 2.24	$ 2.22	$ 2.26	$ 2.24	$ 2.24	$ 2.22	$ 2.26	$ 2.2	$ 2.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 639.68	$ 633.24	$ 627.76	$ 639.68	$ 633.61	$ 633.24	$ 627.76	$ 639.68	$ 621.65	$ 633.24
Annual savings in GHG from electricity savings [kg CO2e/year]	49.7	49.2	48.8	49.7	49.3	49.2	48.8	49.7	48.3	49.2
Annual savings in natural gas [m3/year]	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17	93.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25	$ 863.25
Annual savings in carbon tax for natural gas [$/year]	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46	$ 215.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71	$ 1,078.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1	4788.1
Net Present Value [$]	$ 25,629.44	$ 25,791.61	$ 25,912.71	$ 26,090.5	$ 26,155.36	$ 26,252.67	$ 26,373.77	$ 26,386.9	$ 26,437.9	$ 26,549.07
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	10.51	14.09	8.78	10.51	10.51	14.09	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60	CeilR80	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 1,162.47	$ 305.47	$ 526.08	$ 526.08	$ 1,162.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99	$ 1,274.99
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 1,457.3	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.

MEDIUM 50SAR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,287.65	$ 13,508.26	$ 13,743.12	$ 13,837.65	$ 13,887.65	$ 13,963.73	$ 14,058.26	$ 14,108.26	$ 14,137.65	$ 14,293.12
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 14,961.89	$ 15,210.3	$ 15,474.75	$ 15,581.19	$ 15,637.49	$ 15,723.16	$ 15,829.6	$ 15,885.9	$ 15,918.99	$ 16,094.05
Net Present Value [$]	$ 8,463.15	$ 8,565.5	$ 8,663.99	$ 8,695.77	$ 7,107.83	$ 8,752.22	$ 8,797.88	$ 7,224.36	$ 8,789.76	$ 8,896.61
Incremental dollars per GHG saving	$ 2.34	$ 2.38	$ 2.42	$ 2.41	$ 2.24	$ 2.46	$ 2.45	$ 2.28	$ 2.44	$ 2.49
Auxiliary Energy Required Heating [GJ/yr]	69.1	68.6	68.2	69.1	70.7	67.7	68.6	70.2	69.1	68.2
Annual Energy DHW [GJ/yr]	24.6	24.6	24.5	23.1	14.3	24.5	23.1	14.3	22.2	23.1
Annual Energy Space Heating [GJ/yr]	27.9	27.7	27.6	27.9	28.4	27.4	27.7	28.3	27.9	27.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	81.5	81.3	81.1	80.1	71.7	80.9	79.9	71.5	79.1	79.7
Design Heating Load [W]	14251.9	14162	14136.3	14251.9	13964.8	14046.4	14162	13874.9	14251.9	14136.3
Annual Energy Electricity [kWh/yr]	15806.9	15760.6	15709.6	15806.9	15947.7	15657.9	15760.6	15907.3	15806.9	15709.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,173.36	$ 2,166.81	$ 2,159.59	$ 2,173.36	$ 2,193.28	$ 2,152.28	$ 2,166.81	$ 2,187.57	$ 2,173.36	$ 2,159.59
Annual Energy Natural Gas [m3/yr]	659.4	659.5	658.9	621.5	382.7	659	621.6	382.7	596.9	621
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 284.44	$ 284.49	$ 284.23	$ 268.09	$ 165.08	$ 284.27	$ 268.14	$ 165.08	$ 257.48	$ 267.88
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169570	169840	171190	169571	169573	171460	169841	169843	169572	171191
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	6.13	6.13	6.12	5.82	3.87	6.12	5.82	3.87	5.62	5.81
% ICC	2.5%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	81.9	81.3	80.8	81.9	83.8	80.2	81.3	83.2	81.9	80.8
Output: MEUI [kWh/(m2 * yr)]	65.7	65.5	65.2	64	54	65	63.8	53.9	62.9	63.5
Output: Better than ERS (%)	21840.0%	21760.0%	21680.0%	21290.0%	18010.0%	21600.0%	21210.0%	17930.0%	20900.0%	21130.0%
Output: Better than Envelope (%)	1220.0%	1280.0%	1330.0%	1220.0%	1020.0%	1400.0%	1280.0%	1080.0%	1220.0%	1330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7906	7860	7809	7906	8047	7757	7860	8006	7906	7809
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,114.75	$ 1,108.22	$ 1,101.03	$ 1,114.75	$ 1,134.6	$ 1,093.74	$ 1,108.22	$ 1,128.9	$ 1,114.75	$ 1,101.03
Annual savings in carbon tax for electricity [$/year]	$ 3.95	$ 3.93	$ 3.9	$ 3.95	$ 4.02	$ 3.88	$ 3.93	$ 4.	$ 3.95	$ 3.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,118.7	$ 1,112.15	$ 1,104.93	$ 1,118.7	$ 1,138.62	$ 1,097.62	$ 1,112.15	$ 1,132.91	$ 1,118.7	$ 1,104.93
Annual savings in GHG from electricity savings [kg CO2e/year]	87	86.5	85.9	87	88.5	85.3	86.5	88.1	87	85.9
Annual savings in natural gas [m3/year]	112	111.99	112.02	113.41	122.31	112.01	113.4	122.31	114.33	113.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,037.65	$ 1,037.61	$ 1,037.82	$ 1,050.73	$ 1,133.17	$ 1,037.79	$ 1,050.7	$ 1,133.17	$ 1,059.22	$ 1,050.9
Annual savings in carbon tax for natural gas [$/year]	$ 258.99	$ 258.98	$ 259.04	$ 262.26	$ 282.83	$ 259.03	$ 262.25	$ 282.83	$ 264.38	$ 262.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,296.64	$ 1,296.6	$ 1,296.86	$ 1,312.99	$ 1,416.	$ 1,296.81	$ 1,312.95	$ 1,416.	$ 1,323.6	$ 1,313.2
Annual savings in GHG from natural gas savings [kg CO2e/year]	5755.4	5755.2	5756.3	5827.9	6285.2	5756.1	5827.8	6285.2	5875	5828.9
Net Present Value [$]	$ 8,463.15	$ 8,565.5	$ 8,663.99	$ 8,695.77	$ 7,107.83	$ 8,752.22	$ 8,797.88	$ 7,224.36	$ 8,789.76	$ 8,896.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 50SAR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 13,887.65	$ 14,108.26	$ 14,437.65	$ 14,343.12	$ 14,737.65	$ 14,658.26	$ 13,287.65	$ 14,563.73	$ 14,958.26	$ 14,893.12
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 15,637.49	$ 15,885.9	$ 16,256.79	$ 16,150.35	$ 16,594.59	$ 16,505.2	$ 14,961.89	$ 16,398.76	$ 16,843.	$ 16,769.65
Net Present Value [$]	$ 7,107.83	$ 7,224.36	$ 7,389.83	$ 7,316.44	$ 7,515.38	$ 7,506.37	$ 8,463.15	$ 7,433.53	$ 7,632.09	$ 7,598.45
Incremental dollars per GHG saving	$ 2.24	$ 2.28	$ 2.31	$ 2.31	$ 2.34	$ 2.34	$ 2.34	$ 2.35	$ 2.38	$ 2.38
Auxiliary Energy Required Heating [GJ/yr]	70.7	70.2	70.7	69.8	70.7	70.2	69.1	69.3	70.2	69.8
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	24.6	14.3	12.3	13
Annual Energy Space Heating [GJ/yr]	28.4	28.3	28.4	28.1	28.4	28.3	27.9	27.9	28.3	28.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	71.7	71.5	70.5	71.3	69.7	70.3	81.5	71.2	69.5	70.1
Design Heating Load [W]	13964.8	13874.9	13964.8	13849.2	13964.8	13874.9	14251.9	13759.3	13874.9	13849.2
Annual Energy Electricity [kWh/yr]	15947.7	15907.3	15948.7	15851.8	15949.3	15908.3	15806.9	15811.6	15908.9	15852.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,193.28	$ 2,187.57	$ 2,193.43	$ 2,179.71	$ 2,193.51	$ 2,187.71	$ 2,173.36	$ 2,174.03	$ 2,187.79	$ 2,179.86
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	382.7	329.4	350.4	659.4	382.7	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 151.15	$ 284.44	$ 165.08	$ 142.09	$ 151.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169573	169843	169574	171193	169575	169844	169570	171463	169845	171194
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2131101031
GHGI [kg/m2]	3.87	3.87	3.61	3.87	3.44	3.61	6.13	3.87	3.44	3.61
% ICC	2.7%	2.7%	2.8%	2.7%	2.8%	2.8%	2.5%	2.8%	2.9%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	83.8	83.2	83.8	82.7	83.8	83.2	81.9	82.1	83.2	82.7
Output: MEUI [kWh/(m2 * yr)]	54	53.9	52.6	53.6	51.7	52.4	65.7	53.5	51.5	52.2
Output: Better than ERS (%)	18010.0%	17930.0%	17540.0%	17850.0%	17230.0%	17460.0%	21840.0%	17810.0%	17150.0%	17380.0%
Output: Better than Envelope (%)	1020.0%	1080.0%	1020.0%	1130.0%	1020.0%	1080.0%	1220.0%	1190.0%	1080.0%	1130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8047	8006	8048	7951	8048	8007	7906	7911	8008	7952
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,134.6	$ 1,128.9	$ 1,134.74	$ 1,121.08	$ 1,134.82	$ 1,129.04	$ 1,114.75	$ 1,115.41	$ 1,129.13	$ 1,121.22
Annual savings in carbon tax for electricity [$/year]	$ 4.02	$ 4.	$ 4.02	$ 3.98	$ 4.02	$ 4.	$ 3.95	$ 3.96	$ 4.	$ 3.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,138.62	$ 1,132.91	$ 1,138.76	$ 1,125.05	$ 1,138.85	$ 1,133.05	$ 1,118.7	$ 1,119.36	$ 1,133.13	$ 1,125.19
Annual savings in GHG from electricity savings [kg CO2e/year]	88.5	88.1	88.5	87.5	88.5	88.1	87	87	88.1	87.5
Annual savings in natural gas [m3/year]	122.31	122.31	123.51	122.31	124.29	123.51	112	122.31	124.29	123.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,151.57	$ 1,144.32	$ 1,037.65	$ 1,133.17	$ 1,151.57	$ 1,144.32
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 287.43	$ 285.62	$ 258.99	$ 282.83	$ 287.43	$ 285.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,438.99	$ 1,429.93	$ 1,296.64	$ 1,416.	$ 1,438.99	$ 1,429.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6285.2	6347	6285.2	6387.2	6347	5755.4	6285.2	6387.2	6347
Net Present Value [$]	$ 7,107.83	$ 7,224.36	$ 7,389.83	$ 7,316.44	$ 7,515.38	$ 7,506.37	$ 8,463.15	$ 7,433.53	$ 7,632.09	$ 7,598.45
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	8.78	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.

MEDIUM 50SAR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,150.19	$ 13,887.65	$ 24,446.59	$ 14,108.26	$ 14,343.12	$ 14,437.65	$ 14,563.73	$ 14,658.26	$ 14,737.65	$ 14,893.12
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 27,193.11	$ 15,637.49	$ 27,526.86	$ 15,885.9	$ 16,150.35	$ 16,256.79	$ 16,398.76	$ 16,505.2	$ 16,594.59	$ 16,769.65
Net Present Value [$]	$ 6,897.52	$ 7,107.83	$ 7,193.92	$ 7,224.36	$ 7,316.44	$ 7,389.83	$ 7,433.53	$ 7,506.37	$ 7,515.38	$ 7,598.45
Incremental dollars per GHG saving	$ 6.18	$ 2.24	$ 6.26	$ 2.28	$ 2.31	$ 2.31	$ 2.35	$ 2.34	$ 2.34	$ 2.38
Auxiliary Energy Required Heating [GJ/yr]	46.4	70.7	46.4	70.2	69.8	70.7	69.3	70.2	70.7	69.8
Annual Energy DHW [GJ/yr]	12.3	14.3	12.3	14.3	14.3	13	14.3	13	12.3	13
Annual Energy Space Heating [GJ/yr]	49.1	28.4	49.1	28.3	28.1	28.4	27.9	28.3	28.4	28.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	0.8	1.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	88.7	71.7	88.7	71.5	71.3	70.5	71.2	70.3	69.7	70.1
Design Heating Load [W]	10153.2	13964.8	10153.2	13874.9	13849.2	13964.8	13759.3	13874.9	13964.8	13849.2
Annual Energy Electricity [kWh/yr]	7836.8	15947.7	7836.8	15907.3	15851.8	15948.7	15811.6	15908.3	15949.3	15852.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,045.59	$ 2,193.28	$ 1,045.59	$ 2,187.57	$ 2,179.71	$ 2,193.43	$ 2,174.03	$ 2,187.71	$ 2,193.51	$ 2,179.86
Annual Energy Natural Gas [m3/yr]	1625.3	382.7	1625.3	382.7	382.7	350.4	382.7	350.4	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 701.1	$ 165.08	$ 701.1	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 151.15	$ 142.09	$ 151.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	210408	169573	210696	169843	171193	169574	171463	169844	169575	171194
Upgrade Package List	Pkg4341303034	Pkg2121101031	Pkg4341403034	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2131102031	Pkg2121102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	13.64	3.87	13.64	3.87	3.87	3.61	3.87	3.61	3.44	3.61
% ICC	4.6%	2.7%	4.7%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 5	ACH 0 6	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55	83.8	55	83.2	82.7	83.8	82.1	83.2	83.8	82.7
Output: MEUI [kWh/(m2 * yr)]	74.8	54	74.8	53.9	53.6	52.6	53.5	52.4	51.7	52.2
Output: Better than ERS (%)	24650.0%	18010.0%	24650.0%	17930.0%	17850.0%	17540.0%	17810.0%	17460.0%	17230.0%	17380.0%
Output: Better than Envelope (%)	4100.0%	1020.0%	4100.0%	1080.0%	1130.0%	1020.0%	1190.0%	1080.0%	1020.0%	1130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	64	8047	64	8006	7951	8048	7911	8007	8048	7952
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 9.04	$ 1,134.6	$ 9.04	$ 1,128.9	$ 1,121.08	$ 1,134.74	$ 1,115.41	$ 1,129.04	$ 1,134.82	$ 1,121.22
Annual savings in carbon tax for electricity [$/year]	$ .03	$ 4.02	$ .03	$ 4.	$ 3.98	$ 4.02	$ 3.96	$ 4.	$ 4.02	$ 3.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9.07	$ 1,138.62	$ 9.07	$ 1,132.91	$ 1,125.05	$ 1,138.76	$ 1,119.36	$ 1,133.05	$ 1,138.85	$ 1,125.19
Annual savings in GHG from electricity savings [kg CO2e/year]	0.7	88.5	0.7	88.1	87.5	88.5	87	88.1	88.5	87.5
Annual savings in natural gas [m3/year]	76.01	122.31	76.01	122.31	122.31	123.51	122.31	123.51	124.29	123.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 704.22	$ 1,133.17	$ 704.22	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,144.32	$ 1,151.57	$ 1,144.32
Annual savings in carbon tax for natural gas [$/year]	$ 175.77	$ 282.83	$ 175.77	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 285.62	$ 287.43	$ 285.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 879.98	$ 1,416.	$ 879.98	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,429.93	$ 1,438.99	$ 1,429.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	3906	6285.2	3906	6285.2	6285.2	6347	6285.2	6347	6387.2	6347
Net Present Value [$]	$ 6,897.52	$ 7,107.83	$ 7,193.92	$ 7,224.36	$ 7,316.44	$ 7,389.83	$ 7,433.53	$ 7,506.37	$ 7,515.38	$ 7,598.45
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	8.78	14.09	10.51	8.78	8.78	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR80	CeilR50	CeilR80	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 305.47	$ 1,162.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 22 eff	BC R 40 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	7.04	3.87	7.04	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 5,758.25	$ 10,216.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25	$ 5,758.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,860.71	$ 331.53	$ 1,860.71	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	NA	BC EffR20	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$.	$ 2,214.76	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	NA	HRV sre 85	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$.	$ 2,300.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 850.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.

MEDIUM 50SAR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,562.45	$ 16,783.06	$ 16,812.45	$ 17,017.92	$ 17,033.06	$ 17,112.45	$ 17,188.53	$ 17,238.53	$ 17,267.92	$ 17,333.06
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,649.32	$ 18,897.73	$ 18,930.82	$ 19,162.18	$ 19,179.23	$ 19,268.62	$ 19,354.28	$ 19,410.58	$ 19,443.68	$ 19,517.03
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 9,354.14	$ 7,776.3	$ 9,452.59	$ 7,849.33	$ 9,564.19	$ 7,881.34	$ 9,545.48	$ 7,950.71
Incremental dollars per GHG saving	$ 2.67	$ 2.7	$ 2.9	$ 2.74	$ 2.94	$ 2.73	$ 2.99	$ 2.78	$ 2.98	$ 2.77
Auxiliary Energy Required Heating [GJ/yr]	62.6	62.1	61	61.7	60.5	62.6	59.6	61.2	60.1	62.1
Annual Energy DHW [GJ/yr]	14.3	14.3	22.3	14.3	22.3	13	23.2	14.3	22.3	13
Annual Energy Space Heating [GJ/yr]	25.3	25.1	24.8	25	24.7	25.3	24.3	24.8	24.5	25.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	68.6	68.4	76.2	68.2	76.1	67.4	76.6	68.1	75.8	67.2
Design Heating Load [W]	12964.6	12874.7	13251.7	12849.1	13161.8	12964.6	13046.3	12759.2	13136.2	12874.7
Annual Energy Electricity [kWh/yr]	15087.2	15040.9	14981.3	14991.5	14933.6	15088.2	14838.1	14946.6	14880.3	15041.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,071.52	$ 2,064.97	$ 2,056.54	$ 2,057.98	$ 2,049.79	$ 2,071.67	$ 2,036.28	$ 2,051.63	$ 2,042.25	$ 2,065.11
Annual Energy Natural Gas [m3/yr]	382.7	382.7	598.7	382.7	598.8	350.4	622.9	382.7	598.2	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 258.26	$ 165.08	$ 258.3	$ 151.15	$ 268.7	$ 165.08	$ 258.04	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175945	176215	175944	179077	176214	175946	179345	179347	179076	176216
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2231102031	Pkg2231101031	Pkg2221102031
GHGI [kg/m2]	3.83	3.83	5.59	3.83	5.59	3.57	5.78	3.83	5.58	3.57
% ICC	3.2%	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	74.2	73.6	72.3	73.1	71.7	74.2	70.7	72.5	71.2	73.6
Output: MEUI [kWh/(m2 * yr)]	50.4	50.2	59.4	50	59.2	48.9	59.9	49.8	59	48.7
Output: Better than ERS (%)	16800.0%	16720.0%	19770.0%	16640.0%	19730.0%	16330.0%	19920.0%	16600.0%	19610.0%	16250.0%
Output: Better than Envelope (%)	2050.0%	2110.0%	2250.0%	2160.0%	2310.0%	2050.0%	2430.0%	2220.0%	2360.0%	2110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7186	7140	7080	7091	7033	7187	6937	7046	6979	7141
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,013.27	$ 1,006.74	$ 998.34	$ 999.77	$ 991.61	$ 1,013.41	$ 978.15	$ 993.44	$ 984.1	$ 1,006.88
Annual savings in carbon tax for electricity [$/year]	$ 3.59	$ 3.57	$ 3.54	$ 3.55	$ 3.52	$ 3.59	$ 3.47	$ 3.52	$ 3.49	$ 3.57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,016.86	$ 1,010.31	$ 1,001.88	$ 1,003.32	$ 995.13	$ 1,017.	$ 981.61	$ 996.97	$ 987.59	$ 1,010.45
Annual savings in GHG from electricity savings [kg CO2e/year]	79	78.5	77.9	78	77.4	79.1	76.3	77.5	76.8	78.6
Annual savings in natural gas [m3/year]	122.31	122.31	114.26	122.31	114.25	123.51	113.36	122.31	114.28	123.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,133.17	$ 1,058.6	$ 1,133.17	$ 1,058.57	$ 1,144.32	$ 1,050.25	$ 1,133.17	$ 1,058.77	$ 1,144.32
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 282.83	$ 264.22	$ 282.83	$ 264.21	$ 285.62	$ 262.14	$ 282.83	$ 264.27	$ 285.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,416.	$ 1,322.82	$ 1,416.	$ 1,322.78	$ 1,429.93	$ 1,312.39	$ 1,416.	$ 1,323.04	$ 1,429.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6285.2	5871.6	6285.2	5871.4	6347	5825.3	6285.2	5872.6	6347
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 9,354.14	$ 7,776.3	$ 9,452.59	$ 7,849.33	$ 9,564.19	$ 7,881.34	$ 9,545.48	$ 7,950.71
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$.	$ 850.	$ 550.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 50SAR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,562.45	$ 16,783.06	$ 17,112.45	$ 17,017.92	$ 17,412.45	$ 17,333.06	$ 17,238.53	$ 17,633.06	$ 19,357.06	$ 17,567.92
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,649.32	$ 18,897.73	$ 19,268.62	$ 19,162.18	$ 19,606.42	$ 19,517.03	$ 19,410.58	$ 19,854.83	$ 21,796.05	$ 19,781.48
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 7,849.33	$ 7,776.3	$ 7,974.87	$ 7,950.71	$ 7,881.34	$ 8,076.44	$ 13,838.58	$ 8,058.13
Incremental dollars per GHG saving	$ 2.67	$ 2.7	$ 2.73	$ 2.74	$ 2.76	$ 2.77	$ 2.78	$ 2.8	$ 2.8	$ 2.8
Auxiliary Energy Required Heating [GJ/yr]	62.6	62.1	62.6	61.7	62.6	62.1	61.2	62.1	62.7	61.7
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	14.3	12.3	8.3	13
Annual Energy Space Heating [GJ/yr]	25.3	25.1	25.3	25	25.3	25.1	24.8	25.1	25.4	25
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.7	0.8
Total Energy [GJ/yr]	68.6	68.4	67.4	68.2	66.6	67.2	68.1	66.4	63.7	67
Design Heating Load [W]	12964.6	12874.7	12964.6	12849.1	12964.6	12874.7	12759.2	12874.7	12291.2	12849.1
Annual Energy Electricity [kWh/yr]	15087.2	15040.9	15088.2	14991.5	15088.8	15041.9	14946.6	15042.5	17682.8	14992.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,071.52	$ 2,064.97	$ 2,071.67	$ 2,057.98	$ 2,071.75	$ 2,065.11	$ 2,051.63	$ 2,065.2	$ 2,438.8	$ 2,058.11
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	382.7	329.4	350.4	382.7	329.4	0	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 142.09	$ 151.15	$ 165.08	$ 142.09	$.	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175945	176215	175946	179077	175947	176216	179347	176217	176254	179078
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2231102031	Pkg2221102031	Pkg2221102033	Pkg2231101031
GHGI [kg/m2]	3.83	3.83	3.57	3.83	3.4	3.57	3.83	3.4	0.83	3.57
% ICC	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.7%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	74.2	73.6	74.2	73.1	74.2	73.6	72.5	73.6	74.3	73.1
Output: MEUI [kWh/(m2 * yr)]	50.4	50.2	48.9	50	48	48.7	49.8	47.8	44.5	48.5
Output: Better than ERS (%)	16800.0%	16720.0%	16330.0%	16640.0%	16020.0%	16250.0%	16600.0%	15940.0%	14880.0%	16170.0%
Output: Better than Envelope (%)	2050.0%	2110.0%	2050.0%	2160.0%	2050.0%	2110.0%	2220.0%	2110.0%	2030.0%	2160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7186	7140	7187	7091	7188	7141	7046	7142	9782	7092
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,013.27	$ 1,006.74	$ 1,013.41	$ 999.77	$ 1,013.49	$ 1,006.88	$ 993.44	$ 1,006.97	$ 1,379.25	$ 999.9
Annual savings in carbon tax for electricity [$/year]	$ 3.59	$ 3.57	$ 3.59	$ 3.55	$ 3.59	$ 3.57	$ 3.52	$ 3.57	$ 4.89	$ 3.55
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,016.86	$ 1,010.31	$ 1,017.	$ 1,003.32	$ 1,017.09	$ 1,010.45	$ 996.97	$ 1,010.54	$ 1,384.14	$ 1,003.45
Annual savings in GHG from electricity savings [kg CO2e/year]	79	78.5	79.1	78	79.1	78.6	77.5	78.6	107.6	78
Annual savings in natural gas [m3/year]	122.31	122.31	123.51	122.31	124.29	123.51	122.31	124.29	136.57	123.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,151.57	$ 1,144.32	$ 1,133.17	$ 1,151.57	$ 1,265.28	$ 1,144.32
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 287.43	$ 285.62	$ 282.83	$ 287.43	$ 315.81	$ 285.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,438.99	$ 1,429.93	$ 1,416.	$ 1,438.99	$ 1,581.08	$ 1,429.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6285.2	6347	6285.2	6387.2	6347	6285.2	6387.2	7017.9	6347
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 7,849.33	$ 7,776.3	$ 7,974.87	$ 7,950.71	$ 7,881.34	$ 8,076.44	$ 13,838.58	$ 8,058.13
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	10.51	10.51	10.51	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$.	$ 550.

MEDIUM 50SAR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,562.45	$ 16,783.06	$ 17,017.92	$ 17,112.45	$ 17,238.53	$ 17,333.06	$ 17,412.45	$ 17,567.92	$ 17,633.06	$ 17,788.53
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,649.32	$ 18,897.73	$ 19,162.18	$ 19,268.62	$ 19,410.58	$ 19,517.03	$ 19,606.42	$ 19,781.48	$ 19,854.83	$ 20,029.88
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 7,776.3	$ 7,849.33	$ 7,881.34	$ 7,950.71	$ 7,974.87	$ 8,058.13	$ 8,076.44	$ 8,163.34
Incremental dollars per GHG saving	$ 2.67	$ 2.7	$ 2.74	$ 2.73	$ 2.78	$ 2.77	$ 2.76	$ 2.8	$ 2.8	$ 2.84
Auxiliary Energy Required Heating [GJ/yr]	62.6	62.1	61.7	62.6	61.2	62.1	62.6	61.7	62.1	61.2
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	13	14.3	13	12.3	13	12.3	13
Annual Energy Space Heating [GJ/yr]	25.3	25.1	25	25.3	24.8	25.1	25.3	25	25.1	24.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	68.6	68.4	68.2	67.4	68.1	67.2	66.6	67	66.4	66.9
Design Heating Load [W]	12964.6	12874.7	12849.1	12964.6	12759.2	12874.7	12964.6	12849.1	12874.7	12759.2
Annual Energy Electricity [kWh/yr]	15087.2	15040.9	14991.5	15088.2	14946.6	15041.9	15088.8	14992.4	15042.5	14947.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,071.52	$ 2,064.97	$ 2,057.98	$ 2,071.67	$ 2,051.63	$ 2,065.11	$ 2,071.75	$ 2,058.11	$ 2,065.2	$ 2,051.77
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	350.4	382.7	350.4	329.4	350.4	329.4	350.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 151.15	$ 142.09	$ 151.15	$ 142.09	$ 151.15
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	175945	176215	179077	175946	179347	176216	175947	179078	176217	179348
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031
GHGI [kg/m2]	3.83	3.83	3.83	3.57	3.83	3.57	3.4	3.57	3.4	3.56
% ICC	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	74.2	73.6	73.1	74.2	72.5	73.6	74.2	73.1	73.6	72.5
Output: MEUI [kWh/(m2 * yr)]	50.4	50.2	50	48.9	49.8	48.7	48	48.5	47.8	48.3
Output: Better than ERS (%)	16800.0%	16720.0%	16640.0%	16330.0%	16600.0%	16250.0%	16020.0%	16170.0%	15940.0%	16130.0%
Output: Better than Envelope (%)	2050.0%	2110.0%	2160.0%	2050.0%	2220.0%	2110.0%	2050.0%	2160.0%	2110.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7186	7140	7091	7187	7046	7141	7188	7092	7142	7047
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,013.27	$ 1,006.74	$ 999.77	$ 1,013.41	$ 993.44	$ 1,006.88	$ 1,013.49	$ 999.9	$ 1,006.97	$ 993.58
Annual savings in carbon tax for electricity [$/year]	$ 3.59	$ 3.57	$ 3.55	$ 3.59	$ 3.52	$ 3.57	$ 3.59	$ 3.55	$ 3.57	$ 3.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,016.86	$ 1,010.31	$ 1,003.32	$ 1,017.	$ 996.97	$ 1,010.45	$ 1,017.09	$ 1,003.45	$ 1,010.54	$ 997.11
Annual savings in GHG from electricity savings [kg CO2e/year]	79	78.5	78	79.1	77.5	78.6	79.1	78	78.6	77.5
Annual savings in natural gas [m3/year]	122.31	122.31	122.31	123.51	122.31	123.51	124.29	123.51	124.29	123.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,144.32	$ 1,151.57	$ 1,144.32	$ 1,151.57	$ 1,144.32
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 285.62	$ 287.43	$ 285.62	$ 287.43	$ 285.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,429.93	$ 1,438.99	$ 1,429.93	$ 1,438.99	$ 1,429.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6285.2	6285.2	6347	6285.2	6347	6387.2	6347	6387.2	6347
Net Present Value [$]	$ 7,567.32	$ 7,668.71	$ 7,776.3	$ 7,849.33	$ 7,881.34	$ 7,950.71	$ 7,974.87	$ 8,058.13	$ 8,076.44	$ 8,163.34
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.

MEDIUM 50SAR Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 34,735.92	$ 35,060.59	$ 35,105.12	$ 35,173.24	$ 35,196.98	$ 35,285.92	$ 35,356.99	$ 35,401.52	$ 35,493.38	$ 35,560.59
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 39,112.65	$ 39,478.22	$ 39,528.37	$ 39,605.07	$ 39,631.8	$ 39,731.95	$ 39,811.97	$ 39,862.11	$ 39,965.55	$ 40,041.22
Net Present Value [$]	$ 20,111.15	$ 20,405.51	$ 20,466.47	$ 20,543.36	$ 20,572.21	$ 20,392.97	$ 20,701.91	$ 20,762.87	$ 20,868.61	$ 20,690.97
Incremental dollars per GHG saving	$ 5.58	$ 5.63	$ 5.64	$ 5.65	$ 5.65	$ 5.61	$ 5.68	$ 5.68	$ 5.7	$ 5.71
Auxiliary Energy Required Heating [GJ/yr]	39	39.2	38.9	39.1	39	39.1	39.2	38.9	39	38.1
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	14.3	13	14.3	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	16.3	16.2	16.2	16.3	16.3	16.3	16.2	16.2	16.3	15.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	60.7	60.7	60.7	60.7	59.5	60.7	60.7	60.7	60.7	60.4
Design Heating Load [W]	9462.8	9194.2	9271.9	9435.3	9462.8	9462.8	9194.2	9271.9	9462.8	9156.3
Annual Energy Electricity [kWh/yr]	12900.5	12888.7	12895.1	12898.5	12900.5	12901.4	12888.7	12895.1	12900.5	12805.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,762.11	$ 1,760.44	$ 1,761.34	$ 1,761.82	$ 1,762.11	$ 1,762.23	$ 1,760.44	$ 1,761.34	$ 1,762.11	$ 1,748.65
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	382.7	350.4	382.7	382.7	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 165.08	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	204061	209749	209191	205789	204709	204062	210037	209479	205357	209767
Upgrade Package List	Pkg3331203054	Pkg4331302053	Pkg4321302054	Pkg3341202054	Pkg3321303054	Pkg3331203054	Pkg4331402053	Pkg4321402054	Pkg3331403054	Pkg4331302054
GHGI [kg/m2]	3.73	3.73	3.73	3.73	3.73	3.47	3.73	3.73	3.73	3.73
% ICC	6.6%	6.7%	6.7%	6.7%	6.7%	6.8%	6.8%	6.8%	6.8%	6.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.3	46.4	46.1	46.3	46.3	46.3	46.4	46.1	46.3	45.1
Output: MEUI [kWh/(m2 * yr)]	41	41	41	41	41	39.6	41	41	41	40.6
Output: Better than ERS (%)	13710.0%	13710.0%	13710.0%	13710.0%	13710.0%	13240.0%	13710.0%	13710.0%	13710.0%	13590.0%
Output: Better than Envelope (%)	5040.0%	5020.0%	5060.0%	5030.0%	5040.0%	5030.0%	5020.0%	5060.0%	5040.0%	5160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5000	4988	4994	4998	5000	5000	4988	4994	5000	4904
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 704.94	$ 703.28	$ 704.18	$ 704.66	$ 704.94	$ 705.07	$ 703.28	$ 704.18	$ 704.94	$ 691.53
Annual savings in carbon tax for electricity [$/year]	$ 2.5	$ 2.49	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.49	$ 2.5	$ 2.5	$ 2.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 707.44	$ 705.77	$ 706.68	$ 707.16	$ 707.44	$ 707.57	$ 705.77	$ 706.68	$ 707.44	$ 693.99
Annual savings in GHG from electricity savings [kg CO2e/year]	55	54.9	54.9	55	55	55	54.9	54.9	55	53.9
Annual savings in natural gas [m3/year]	122.31	122.31	122.31	122.31	122.31	123.51	122.31	122.31	122.31	122.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,133.17
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 282.83	$ 282.83	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 282.83	$ 282.83	$ 282.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,416.
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6285.2	6285.2	6285.2	6285.2	6347	6285.2	6285.2	6285.2	6285.2
Net Present Value [$]	$ 20,111.15	$ 20,405.51	$ 20,466.47	$ 20,543.36	$ 20,572.21	$ 20,392.97	$ 20,701.91	$ 20,762.87	$ 20,868.61	$ 20,690.97
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.51	10.51	10.51	14.09	14.09	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 1,860.71	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 2,214.76	$ 2,214.76	$ 2,214.76	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.

MEDIUM 50SAR Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 34,735.92	$ 35,285.92	$ 35,585.92	$ 35,060.59	$ 35,105.12	$ 35,173.24	$ 35,196.98	$ 35,610.59	$ 35,655.12	$ 35,910.59
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 39,112.65	$ 39,731.95	$ 40,069.75	$ 39,478.22	$ 39,528.37	$ 39,605.07	$ 39,631.8	$ 40,097.52	$ 40,147.67	$ 40,435.32
Net Present Value [$]	$ 20,111.15	$ 20,392.97	$ 20,518.7	$ 20,405.51	$ 20,466.47	$ 20,543.36	$ 20,572.21	$ 20,687.33	$ 20,748.3	$ 20,812.88
Incremental dollars per GHG saving	$ 5.58	$ 5.61	$ 5.62	$ 5.63	$ 5.64	$ 5.65	$ 5.65	$ 5.66	$ 5.67	$ 5.67
Auxiliary Energy Required Heating [GJ/yr]	39	39.1	39.1	39.2	38.9	39.1	39	39.2	38.9	39.2
Annual Energy DHW [GJ/yr]	14.3	13	12.3	14.3	14.3	14.3	14.3	13	13	12.3
Annual Energy Space Heating [GJ/yr]	16.3	16.3	16.3	16.2	16.2	16.3	16.3	16.2	16.2	16.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	60.7	59.5	58.7	60.7	60.7	60.7	60.7	59.5	59.5	58.7
Design Heating Load [W]	9462.8	9462.8	9462.8	9194.2	9271.9	9435.3	9462.8	9194.2	9271.9	9194.2
Annual Energy Electricity [kWh/yr]	12900.5	12901.4	12902	12888.7	12895.1	12898.5	12900.5	12889.6	12896	12890.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,762.11	$ 1,762.23	$ 1,762.32	$ 1,760.44	$ 1,761.34	$ 1,761.82	$ 1,762.11	$ 1,760.56	$ 1,761.47	$ 1,760.65
Annual Energy Natural Gas [m3/yr]	382.7	350.4	329.4	382.7	382.7	382.7	382.7	350.4	350.4	329.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 142.09	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 151.15	$ 142.09
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	204061	204062	204063	209749	209191	205789	204709	209750	209192	209751
Upgrade Package List	Pkg3331203054	Pkg3331203054	Pkg3331203054	Pkg4331302053	Pkg4321302054	Pkg3341202054	Pkg3331303054	Pkg4331302053	Pkg4321302054	Pkg4331302053
GHGI [kg/m2]	3.73	3.47	3.3	3.73	3.73	3.73	3.73	3.47	3.47	3.3
% ICC	6.6%	6.8%	6.8%	6.7%	6.7%	6.7%	6.7%	6.8%	6.8%	6.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.3	46.3	46.3	46.4	46.1	46.3	46.3	46.4	46.1	46.4
Output: MEUI [kWh/(m2 * yr)]	41	39.6	38.7	41	41	41	41	39.5	39.6	38.6
Output: Better than ERS (%)	13710.0%	13240.0%	12930.0%	13710.0%	13710.0%	13710.0%	13710.0%	13240.0%	13240.0%	12930.0%
Output: Better than Envelope (%)	5040.0%	5030.0%	5030.0%	5020.0%	5060.0%	5030.0%	5040.0%	5020.0%	5060.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5000	5000	5001	4988	4994	4998	5000	4989	4995	4989
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 704.94	$ 705.07	$ 705.16	$ 703.28	$ 704.18	$ 704.66	$ 704.94	$ 703.41	$ 704.31	$ 703.49
Annual savings in carbon tax for electricity [$/year]	$ 2.5	$ 2.5	$ 2.5	$ 2.49	$ 2.5	$ 2.5	$ 2.5	$ 2.49	$ 2.5	$ 2.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 707.44	$ 707.57	$ 707.66	$ 705.77	$ 706.68	$ 707.16	$ 707.44	$ 705.9	$ 706.81	$ 705.99
Annual savings in GHG from electricity savings [kg CO2e/year]	55	55	55	54.9	54.9	55	55	54.9	54.9	54.9
Annual savings in natural gas [m3/year]	122.31	123.51	124.29	122.31	122.31	122.31	122.31	123.51	123.51	124.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,144.32	$ 1,151.57	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,144.32	$ 1,151.57
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 285.62	$ 287.43	$ 282.83	$ 282.83	$ 282.83	$ 282.83	$ 285.62	$ 285.62	$ 287.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,429.93	$ 1,438.99	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,429.93	$ 1,438.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6347	6387.2	6285.2	6285.2	6285.2	6285.2	6347	6347	6387.2
Net Present Value [$]	$ 20,111.15	$ 20,392.97	$ 20,518.7	$ 20,405.51	$ 20,466.47	$ 20,543.36	$ 20,572.21	$ 20,687.33	$ 20,748.3	$ 20,812.88
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	10.51	10.51	10.51	14.09	10.51	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 787.	$ 331.53	$ 1,860.71	$ 787.	$ 787.	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.

MEDIUM 50SAR Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k	Medium 50SAR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 34,735.92	$ 35,285.92	$ 35,060.59	$ 35,105.12	$ 35,585.92	$ 35,173.24	$ 35,196.98	$ 35,610.59	$ 35,560.59	$ 35,356.99
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 39,112.65	$ 39,731.95	$ 39,478.22	$ 39,528.37	$ 40,069.75	$ 39,605.07	$ 39,631.8	$ 40,097.52	$ 40,041.22	$ 39,811.97
Net Present Value [$]	$ 20,111.15	$ 20,392.97	$ 20,405.51	$ 20,466.47	$ 20,518.7	$ 20,543.36	$ 20,572.21	$ 20,687.33	$ 20,690.97	$ 20,701.91
Incremental dollars per GHG saving	$ 5.58	$ 5.61	$ 5.63	$ 5.64	$ 5.62	$ 5.65	$ 5.65	$ 5.66	$ 5.71	$ 5.68
Auxiliary Energy Required Heating [GJ/yr]	39	39.1	39.2	38.9	39.1	39.1	39	39.2	38.1	39.2
Annual Energy DHW [GJ/yr]	14.3	13	14.3	14.3	12.3	14.3	14.3	13	14.3	14.3
Annual Energy Space Heating [GJ/yr]	16.3	16.3	16.2	16.2	16.3	16.3	16.3	16.2	15.9	16.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	60.7	59.5	60.7	60.7	58.7	60.7	60.7	59.5	60.4	60.7
Design Heating Load [W]	9462.8	9462.8	9194.2	9271.9	9462.8	9435.3	9462.8	9194.2	9156.3	9194.2
Annual Energy Electricity [kWh/yr]	12900.5	12901.4	12888.7	12895.1	12902	12898.5	12900.5	12889.6	12805.4	12888.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,762.11	$ 1,762.23	$ 1,760.44	$ 1,761.34	$ 1,762.32	$ 1,761.82	$ 1,762.11	$ 1,760.56	$ 1,748.65	$ 1,760.44
Annual Energy Natural Gas [m3/yr]	382.7	350.4	382.7	382.7	329.4	382.7	382.7	350.4	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 165.08	$ 165.08	$ 151.15	$ 165.08	$ 165.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	204061	204062	209749	209191	204063	205789	204709	209750	209767	210037
Upgrade Package List	Pkg3331203054	Pkg3331203054	Pkg4331302053	Pkg4321302054	Pkg3331203054	Pkg3341202054	Pkg3331303054	Pkg4331302053	Pkg4331302054	Pkg4331402053
GHGI [kg/m2]	3.73	3.47	3.73	3.73	3.3	3.73	3.73	3.47	3.73	3.73
% ICC	6.6%	6.8%	6.7%	6.7%	6.8%	6.7%	6.7%	6.8%	6.8%	6.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.3	46.3	46.4	46.1	46.3	46.3	46.3	46.4	45.1	46.4
Output: MEUI [kWh/(m2 * yr)]	41	39.6	41	41	38.7	41	41	39.5	40.6	41
Output: Better than ERS (%)	13710.0%	13240.0%	13710.0%	13710.0%	12930.0%	13710.0%	13710.0%	13240.0%	13590.0%	13710.0%
Output: Better than Envelope (%)	5040.0%	5030.0%	5020.0%	5060.0%	5030.0%	5030.0%	5040.0%	5020.0%	5160.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5000	5000	4988	4994	5001	4998	5000	4989	4904	4988
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 704.94	$ 705.07	$ 703.28	$ 704.18	$ 705.16	$ 704.66	$ 704.94	$ 703.41	$ 691.53	$ 703.28
Annual savings in carbon tax for electricity [$/year]	$ 2.5	$ 2.5	$ 2.49	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.49	$ 2.45	$ 2.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 707.44	$ 707.57	$ 705.77	$ 706.68	$ 707.66	$ 707.16	$ 707.44	$ 705.9	$ 693.99	$ 705.77
Annual savings in GHG from electricity savings [kg CO2e/year]	55	55	54.9	54.9	55	55	55	54.9	53.9	54.9
Annual savings in natural gas [m3/year]	122.31	123.51	122.31	122.31	124.29	122.31	122.31	123.51	122.31	122.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,133.17	$ 1,151.57	$ 1,133.17	$ 1,133.17	$ 1,144.32	$ 1,133.17	$ 1,133.17
Annual savings in carbon tax for natural gas [$/year]	$ 282.83	$ 285.62	$ 282.83	$ 282.83	$ 287.43	$ 282.83	$ 282.83	$ 285.62	$ 282.83	$ 282.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,416.	$ 1,438.99	$ 1,416.	$ 1,416.	$ 1,429.93	$ 1,416.	$ 1,416.
Annual savings in GHG from natural gas savings [kg CO2e/year]	6285.2	6347	6285.2	6285.2	6387.2	6285.2	6285.2	6347	6285.2	6285.2
Net Present Value [$]	$ 20,111.15	$ 20,392.97	$ 20,405.51	$ 20,466.47	$ 20,518.7	$ 20,543.36	$ 20,572.21	$ 20,687.33	$ 20,690.97	$ 20,701.91
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.51	10.51	14.09	10.51	14.09	10.51	10.51	10.51
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,162.47	$ 1,162.47	$ 526.08	$ 526.08	$ 1,162.47	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 1,860.71	$ 787.	$ 787.	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$.	$.	$ 550.	$.	$.

MEDIUM 50SAR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 12,787.25	$ 13,007.99	$ 13,242.58	$ 13,287.25	$ 13,337.25	$ 13,387.25	$ 13,463.32	$ 13,469.44	$ 13,507.99	$ 13,528.45
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,206.45	$ 19,538.	$ 19,890.36	$ 19,957.45	$ 20,032.55	$ 20,107.65	$ 20,221.91	$ 20,231.1	$ 20,289.	$ 20,319.73
Net Present Value [$]	$ 15,040.82	$ 15,073.13	$ 15,116.57	$ 13,094.55	$ 15,209.86	$ 13,341.29	$ 15,150.04	$ 15,986.75	$ 13,092.9	$ 14,814.3
Incremental dollars per GHG saving	$ 1.72	$ 1.75	$ 1.78	$ 1.78	$ 1.77	$ 1.67	$ 1.81	$ 1.81	$ 1.81	$ 1.82
Auxiliary Energy Required Heating [GJ/yr]	102	101.4	100.8	95.4	102	103.2	100.2	105.6	94.7	101.3
Annual Energy DHW [GJ/yr]	26.6	26.6	26.6	26.6	24.9	15.8	26.6	26.7	26.6	26.6
Annual Energy Space Heating [GJ/yr]	51.3	51.1	50.8	47.9	51.3	51.5	50.6	51.9	47.6	50.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	105.4	105.1	104.8	101.9	103.7	94.7	104.5	105.8	101.6	104
Design Heating Load [W]	18545.2	18438.4	18410.2	17278.8	18545.2	18134.1	18303.5	17506.7	17172.1	17278.8
Annual Energy Electricity [kWh/yr]	21871.5	21798.3	21726.3	20921.6	21871.5	21924.8	21653.2	21970.4	20835.2	21493.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,031.5	$ 3,021.14	$ 3,010.96	$ 2,897.09	$ 3,031.5	$ 3,039.04	$ 3,000.61	$ 3,045.5	$ 2,884.87	$ 2,978.03
Annual Energy Natural Gas [m3/yr]	714.8	714.8	714.1	714.7	669.3	423.9	714.2	715.9	714.7	715.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 308.34	$ 308.34	$ 308.04	$ 308.3	$ 288.71	$ 182.86	$ 308.08	$ 308.81	$ 308.3	$ 308.6
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1738	2008	3358	11458	1739	1741	3628	17722	11728	11404
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg1131101031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131102031	Pkg2221101011	Pkg2121102031	Pkg2121101021
GHGI [kg/m2]	6.87	6.86	6.85	6.82	6.49	4.49	6.85	6.88	6.82	6.85
% ICC	2.4%	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1.5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	120.9	120.1	119.5	113	120.9	122.3	118.7	125.2	112.2	120
Output: MEUI [kWh/(m2 * yr)]	94.3	94	93.6	90.2	92.3	81.7	93.3	94.9	89.9	92.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1350.0%	1400.0%	1450.0%	1910.0%	1350.0%	1250.0%	1500.0%	1040.0%	1970.0%	1410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13783	13710	13638	12834	13783	13837	13565	13882	12747	13406
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,943.46	$ 1,933.14	$ 1,922.99	$ 1,809.52	$ 1,943.46	$ 1,950.97	$ 1,912.68	$ 1,957.4	$ 1,797.34	$ 1,890.18
Annual savings in carbon tax for electricity [$/year]	$ 6.89	$ 6.86	$ 6.82	$ 6.42	$ 6.89	$ 6.92	$ 6.78	$ 6.94	$ 6.37	$ 6.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,950.35	$ 1,939.99	$ 1,929.81	$ 1,815.94	$ 1,950.35	$ 1,957.89	$ 1,919.46	$ 1,964.35	$ 1,803.71	$ 1,896.88
Annual savings in GHG from electricity savings [kg CO2e/year]	151.6	150.8	150	141.2	151.6	152.2	149.2	152.7	140.2	147.5
Annual savings in natural gas [m3/year]	147.82	147.82	147.84	147.82	149.51	158.66	147.84	147.78	147.82	147.79
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,369.53	$ 1,369.53	$ 1,369.77	$ 1,369.56	$ 1,385.23	$ 1,469.95	$ 1,369.73	$ 1,369.15	$ 1,369.56	$ 1,369.32
Annual savings in carbon tax for natural gas [$/year]	$ 341.83	$ 341.83	$ 341.89	$ 341.84	$ 345.75	$ 366.89	$ 341.88	$ 341.73	$ 341.84	$ 341.78
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,711.35	$ 1,711.35	$ 1,711.66	$ 1,711.4	$ 1,730.98	$ 1,836.84	$ 1,711.61	$ 1,710.88	$ 1,711.4	$ 1,711.1
Annual savings in GHG from natural gas savings [kg CO2e/year]	7596.2	7596.2	7597.5	7596.4	7683.3	8153.2	7597.3	7594.1	7596.4	7595
Net Present Value [$]	$ 15,040.82	$ 15,073.13	$ 15,116.57	$ 13,094.55	$ 15,209.86	$ 13,341.29	$ 15,150.04	$ 15,986.75	$ 13,092.9	$ 14,814.3
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	8.78	8.78	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 526.38	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$.	$ 2,492.4	$ 2,733.6
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 8,432.37	$ 5,757.78	$ 5,757.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

MEDIUM 50SAR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,661.25	$ 13,387.25	$ 14,881.99	$ 13,607.99	$ 12,787.25	$ 15,116.58	$ 13,937.25	$ 13,842.58	$ 15,211.25	$ 13,887.25
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,021.2	$ 20,107.65	$ 22,352.75	$ 20,439.2	$ 19,206.45	$ 22,705.1	$ 20,933.75	$ 20,791.56	$ 22,847.3	$ 20,858.65
Net Present Value [$]	$ 16,885.82	$ 13,341.29	$ 16,911.38	$ 13,374.15	$ 15,040.82	$ 16,931.07	$ 13,570.4	$ 13,423.23	$ 16,802.44	$ 11,414.73
Incremental dollars per GHG saving	$ 1.67	$ 1.67	$ 1.69	$ 1.7	$ 1.72	$ 1.72	$ 1.73	$ 1.73	$ 1.73	$ 1.73
Auxiliary Energy Required Heating [GJ/yr]	102.1	103.2	101.4	102.6	102	100.9	103.2	102	101.7	96.6
Annual Energy DHW [GJ/yr]	9.1	15.8	9.1	15.8	26.6	9.1	14.3	15.8	8.4	15.8
Annual Energy Space Heating [GJ/yr]	50.5	51.5	50.3	51.3	51.3	50	51.5	51	50.4	48.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	87.1	94.7	86.8	94.5	105.4	86.5	93.3	94.2	86.2	91.3
Design Heating Load [W]	17278.8	18134.1	17172.1	18027.4	18545.2	17143.9	18134.1	17999.2	17278.8	16874.4
Annual Energy Electricity [kWh/yr]	24185.9	21924.8	24110.1	21851.8	21871.5	24026.6	21926.3	21779.7	23939.9	20982.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,358.99	$ 3,039.04	$ 3,348.26	$ 3,028.71	$ 3,031.5	$ 3,336.45	$ 3,039.26	$ 3,018.51	$ 3,324.18	$ 2,905.67
Annual Energy Natural Gas [m3/yr]	0	423.9	0	423.9	714.8	0	385.1	423.9	0	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ -	$ 182.86	$ -	$ 182.86	$ 308.34	$ -	$ 166.12	$ 182.86	$ -	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	1741	11734	2011	1738	13084	1742	3361	11465	11461
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg1121102031	Pkg1121101031	Pkg2131101031	Pkg1121101031	Pkg1131101031	Pkg2121101031	Pkg2121101031
GHGI [kg/m2]	1.14	4.49	1.13	4.49	6.87	1.13	4.17	4.48	1.12	4.45
% ICC	2.8%	2.6%	2.8%	2.6%	2.4%	2.9%	2.7%	2.6%	2.9%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 2.5	ACH 1.5	ACH 2.5	ACH 2.5	ACH 1.5	ACH 2.5	ACH 2.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	121	122.3	120.2	121.5	120.9	119.6	122.3	120.9	120.6	114.5
Output: MEUI [kWh/(m2 * yr)]	72.6	81.7	72.3	81.4	94.3	71.9	80	81.1	71.6	77.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1340.0%	1250.0%	1400.0%	1300.0%	1350.0%	1440.0%	1250.0%	1350.0%	1370.0%	1810.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16098	13837	16022	13764	13783	15938	13838	13692	15852	12894
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,269.79	$ 1,950.97	$ 2,259.1	$ 1,940.68	$ 1,943.46	$ 2,247.33	$ 1,951.19	$ 1,930.52	$ 2,235.1	$ 1,818.07
Annual savings in carbon tax for electricity [$/year]	$ 8.05	$ 6.92	$ 8.01	$ 6.88	$ 6.89	$ 7.97	$ 6.92	$ 6.85	$ 7.93	$ 6.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,277.84	$ 1,957.89	$ 2,267.11	$ 1,947.56	$ 1,950.35	$ 2,255.3	$ 1,958.11	$ 1,937.36	$ 2,243.03	$ 1,824.52
Annual savings in GHG from electricity savings [kg CO2e/year]	177.1	152.2	176.2	151.4	151.6	175.3	152.2	150.6	174.4	141.8
Annual savings in natural gas [m3/year]	174.45	158.66	174.45	158.66	147.82	174.45	160.1	158.66	174.45	158.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,616.28	$ 1,469.95	$ 1,616.28	$ 1,469.95	$ 1,369.53	$ 1,616.28	$ 1,483.34	$ 1,469.95	$ 1,616.28	$ 1,469.95
Annual savings in carbon tax for natural gas [$/year]	$ 403.42	$ 366.89	$ 403.42	$ 366.89	$ 341.83	$ 403.42	$ 370.23	$ 366.89	$ 403.42	$ 366.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,019.69	$ 1,836.84	$ 2,019.69	$ 1,836.84	$ 1,711.35	$ 2,019.69	$ 1,853.58	$ 1,836.84	$ 2,019.69	$ 1,836.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	8964.8	8153.2	8964.8	8153.2	7596.2	8964.8	8227.4	8153.2	8964.8	8153.2
Net Present Value [$]	$ 16,885.82	$ 13,341.29	$ 16,911.38	$ 13,374.15	$ 15,040.82	$ 16,931.07	$ 13,570.4	$ 13,423.23	$ 16,802.44	$ 11,414.73
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	8.78	10.51	10.51	8.78	8.78	8.78	8.78	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ -	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ 550.	$ -	$ 550.	$ -

MEDIUM 50SAR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 30,448.17	$ 30,492.84	$ 30,542.84	$ 30,622.1	$ 30,727.43	$ 30,842.84	$ 30,777.43	$ 30,822.1	$ 30,948.17	$ 30,998.17
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 45,733.15	$ 45,800.25	$ 45,875.35	$ 45,994.39	$ 46,152.6	$ 46,325.95	$ 46,227.7	$ 46,294.79	$ 46,484.15	$ 46,559.25
Net Present Value [$]	$ 8,093.69	$ 8,113.79	$ 8,145.4	$ 8,167.18	$ 8,226.85	$ 8,231.81	$ 8,255.79	$ 8,276.62	$ 8,293.36	$ 8,321.58
Incremental dollars per GHG saving	$ 6.09	$ 6.09	$ 6.09	$ 6.09	$ 6.1	$ 6.09	$ 6.1	$ 6.11	$ 6.11	$ 6.11
Auxiliary Energy Required Heating [GJ/yr]	58.9	58.8	60.1	60.7	58.3	60.1	59.6	59.5	57.7	58.9
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	13.4	15.8	13.4	14.3	14.3	15.8	14.3
Annual Energy Space Heating [GJ/yr]	62.4	62.3	63.6	64.3	61.8	63.6	63.1	63	61.1	62.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	105.5	105.4	105.3	105	104.9	104.4	104.8	104.7	104.3	104.1
Design Heating Load [W]	11455.8	11545.8	11590.8	11697.6	11517.7	11590.8	11562.6	11652.6	11410.9	11455.8
Annual Energy Electricity [kWh/yr]	7903	7902.5	7909	7912.4	7899.9	7909.1	7906.4	7905.9	7896.6	7903.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,054.96	$ 1,054.89	$ 1,055.81	$ 1,056.29	$ 1,054.52	$ 1,055.82	$ 1,055.44	$ 1,055.37	$ 1,054.05	$ 1,054.97
Annual Energy Natural Gas [m3/yr]	2070.2	2067.4	2063.2	2055.3	2053.7	2037.7	2049.2	2046.5	2036.3	2031.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 893.01	$ 891.8	$ 889.99	$ 886.58	$ 885.89	$ 878.99	$ 883.95	$ 882.79	$ 878.39	$ 876.4
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	45706	43780	43763	43548	45508	43764	45491	43565	45724	45707
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg3321202053	Pkg3321201053	Pkg3331201054	Pkg3321202053	Pkg3331201053	Pkg3321201054	Pkg3331202054	Pkg3331202053
GHGI [kg/m2]	17.28	17.26	17.22	17.16	17.15	17.02	17.11	17.09	17	16.97
% ICC	5.8%	5.8%	5.8%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69.8	69.7	71.2	72	69.1	71.2	70.6	70.5	68.4	69.9
Output: MEUI [kWh/(m2 * yr)]	94.7	94.6	94.4	94.1	94	93.3	93.8	93.7	93.2	93
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5000.0%	5010.0%	4900.0%	4850.0%	5060.0%	4900.0%	4940.0%	4950.0%	5110.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	185	186	179	176	188	179	182	182	192	185
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 26.1	$ 26.17	$ 25.25	$ 24.77	$ 26.54	$ 25.24	$ 25.62	$ 25.69	$ 27.	$ 26.08
Annual savings in carbon tax for electricity [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .1	$ .09
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 26.19	$ 26.26	$ 25.34	$ 24.86	$ 26.63	$ 25.33	$ 25.71	$ 25.78	$ 27.1	$ 26.18
Annual savings in GHG from electricity savings [kg CO2e/year]	2	2	2	1.9	2.1	2	2	2	2.1	2
Annual savings in natural gas [m3/year]	97.32	97.42	97.58	97.87	97.93	98.53	98.1	98.2	98.58	98.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 901.64	$ 902.6	$ 904.05	$ 906.78	$ 907.33	$ 912.86	$ 908.89	$ 909.82	$ 913.34	$ 914.93
Annual savings in carbon tax for natural gas [$/year]	$ 225.04	$ 225.29	$ 225.65	$ 226.33	$ 226.47	$ 227.84	$ 226.85	$ 227.09	$ 227.97	$ 228.36
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,126.68	$ 1,127.89	$ 1,129.7	$ 1,133.11	$ 1,133.8	$ 1,140.7	$ 1,135.74	$ 1,136.91	$ 1,141.31	$ 1,143.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	5001	5006.4	5014.4	5029.5	5032.6	5063.2	5041.2	5046.4	5065.9	5074.7
Net Present Value [$]	$ 8,093.69	$ 8,113.79	$ 8,145.4	$ 8,167.18	$ 8,226.85	$ 8,231.81	$ 8,255.79	$ 8,276.62	$ 8,293.36	$ 8,321.58
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	8.78	8.78	10.51	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 850.	$ 550.	$ 550.	$.	$ 550.

MEDIUM 50SAR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,237.25	$ 16,317.99	$ 16,457.99	$ 16,537.25	$ 16,552.58	$ 16,561.84	$ 16,692.58	$ 16,757.99	$ 16,773.32	$ 16,782.58
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,388.35	$ 24,509.62	$ 24,719.9	$ 24,838.95	$ 24,861.98	$ 24,875.88	$ 25,072.26	$ 25,170.5	$ 25,193.53	$ 25,207.44
Net Present Value [$]	$ 12,823.97	$ 13,202.55	$ 12,853.73	$ 12,911.12	$ 13,248.16	$ 10,710.59	$ 12,897.7	$ 12,940.87	$ 13,269.7	$ 10,743.63
Incremental dollars per GHG saving	$ 2.01	$ 2.01	$ 2.04	$ 2.03	$ 2.03	$ 2.06	$ 2.06	$ 2.06	$ 2.06	$ 2.09
Auxiliary Energy Required Heating [GJ/yr]	92.5	94	91.8	92.5	93.5	86.5	91.3	91.8	92.8	85.8
Annual Energy DHW [GJ/yr]	14.3	13.4	14.3	13.4	13.4	15.8	14.3	13.4	13.4	15.8
Annual Energy Space Heating [GJ/yr]	46.3	47	46.1	46.3	46.8	43.4	45.8	46.1	46.5	43.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	0.8	1.7	1.7	1.7	0.8
Total Energy [GJ/yr]	89	88.8	88.7	88.1	88.5	86.6	88.5	87.8	88.2	86.3
Design Heating Load [W]	15840.6	15943.6	15733.8	15840.6	15915.4	15686.8	15705.7	15733.8	15808.7	15580
Annual Energy Electricity [kWh/yr]	20743	20942.3	20668.8	20743.9	20868.9	19669.8	20594.8	20669.7	20791.5	19596.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,871.82	$ 2,900.02	$ 2,861.32	$ 2,871.95	$ 2,889.63	$ 2,719.96	$ 2,850.85	$ 2,861.45	$ 2,878.68	$ 2,709.65
Annual Energy Natural Gas [m3/yr]	385.1	359.4	385.1	359.4	359.4	423.9	385.1	359.4	359.4	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 166.12	$ 155.03	$ 166.12	$ 155.03	$ 155.03	$ 182.86	$ 166.12	$ 155.03	$ 155.03	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11498	11751	11768	11499	13101	17833	13118	11769	13371	18103
Upgrade Package List	Pkg2121101033	Pkg2121102032	Pkg2121102033	Pkg2121101033	Pkg2131101032	Pkg2221101031	Pkg2131101033	Pkg2121102033	Pkg2131102032	Pkg2221102031
GHGI [kg/m2]	4.12	3.92	4.12	3.91	3.92	4.39	4.11	3.91	3.91	4.38
% ICC	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	109.6	111.4	108.8	109.6	110.8	102.5	108.2	108.8	110	101.7
Output: MEUI [kWh/(m2 * yr)]	74.9	74.6	74.6	73.8	74.3	72.1	74.3	73.5	74	71.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2150.0%	2030.0%	2210.0%	2150.0%	2070.0%	2660.0%	2260.0%	2210.0%	2130.0%	2720.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12655	12854	12581	12656	12781	11582	12507	12582	12703	11509
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,784.34	$ 1,812.44	$ 1,773.88	$ 1,784.47	$ 1,802.09	$ 1,633.02	$ 1,763.44	$ 1,774.01	$ 1,791.18	$ 1,622.74
Annual savings in carbon tax for electricity [$/year]	$ 6.33	$ 6.43	$ 6.29	$ 6.33	$ 6.39	$ 5.79	$ 6.25	$ 6.29	$ 6.35	$ 5.75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,790.67	$ 1,818.87	$ 1,780.17	$ 1,790.8	$ 1,808.48	$ 1,638.81	$ 1,769.7	$ 1,780.3	$ 1,797.53	$ 1,628.5
Annual savings in GHG from electricity savings [kg CO2e/year]	139.2	141.4	138.4	139.2	140.6	127.4	137.6	138.4	139.7	126.6
Annual savings in natural gas [m3/year]	160.1	161.06	160.1	161.06	161.06	158.66	160.1	161.06	161.06	158.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,483.34	$ 1,492.21	$ 1,483.34	$ 1,492.21	$ 1,492.21	$ 1,469.95	$ 1,483.34	$ 1,492.21	$ 1,492.21	$ 1,469.95
Annual savings in carbon tax for natural gas [$/year]	$ 370.23	$ 372.45	$ 370.23	$ 372.45	$ 372.45	$ 366.89	$ 370.23	$ 372.45	$ 372.45	$ 366.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,853.58	$ 1,864.66	$ 1,853.58	$ 1,864.66	$ 1,864.66	$ 1,836.84	$ 1,853.58	$ 1,864.66	$ 1,864.66	$ 1,836.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	8227.4	8276.6	8227.4	8276.6	8276.6	8153.2	8227.4	8276.6	8276.6	8153.2
Net Present Value [$]	$ 12,823.97	$ 13,202.55	$ 12,853.73	$ 12,911.12	$ 13,248.16	$ 10,710.59	$ 12,897.7	$ 12,940.87	$ 13,269.7	$ 10,743.63
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	8.78	10.51	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 8,432.37	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 8,432.37
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	NA	HRV sre 75	HRV sre 75	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$ 550.	$ 850.	$ 850.	$.

MEDIUM 50SAR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 17,335.84	$ 17,556.58	$ 16,317.99	$ 16,237.25	$ 17,791.17	$ 17,885.84	$ 16,537.25	$ 16,552.58	$ 16,457.99	$ 18,011.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 26,038.43	$ 26,369.98	$ 24,509.62	$ 24,388.35	$ 26,722.34	$ 26,864.53	$ 24,838.95	$ 24,861.98	$ 24,719.9	$ 27,053.89
Net Present Value [$]	$ 16,178.03	$ 16,224.21	$ 13,202.55	$ 12,823.97	$ 16,260.88	$ 16,095.55	$ 12,911.12	$ 13,248.16	$ 12,853.73	$ 16,269.82
Incremental dollars per GHG saving	$ 1.97	$ 1.99	$ 2.01	$ 2.01	$ 2.02	$ 2.03	$ 2.03	$ 2.03	$ 2.04	$ 2.05
Auxiliary Energy Required Heating [GJ/yr]	91.9	91.2	94	92.5	90.7	91.5	92.5	93.5	91.8	90.1
Annual Energy DHW [GJ/yr]	9.1	9.1	13.4	14.3	9.1	8.4	13.4	13.4	14.3	9.1
Annual Energy Space Heating [GJ/yr]	45.8	45.6	47	46.3	45.3	45.7	46.3	46.8	46.1	45
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	1.7	1.7	0.8	0.8	1.7	1.7	1.7	0.8
Total Energy [GJ/yr]	82.3	82.1	88.8	89	81.8	81.5	88.1	88.5	88.7	81.5
Design Heating Load [W]	16091.2	15984.4	15943.6	15840.6	15956.2	16091.2	15840.6	15915.4	15733.8	15849.5
Annual Energy Electricity [kWh/yr]	22872.1	22804.3	20942.3	20743.9	22727.4	22626.4	20743.9	20868.9	20668.8	22645.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,173.09	$ 3,163.49	$ 2,900.02	$ 2,871.82	$ 3,152.61	$ 3,138.32	$ 2,871.95	$ 2,889.63	$ 2,861.32	$ 3,140.97
Annual Energy Natural Gas [m3/yr]	0	0	359.4	385.1	0	0	359.4	359.4	385.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 155.03	$ 166.12	$.	$.	$ 155.03	$ 155.03	$ 166.12	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17836	18106	11751	11498	20968	17837	11499	13101	11768	21238
Upgrade Package List	Pkg2222101031	Pkg2221102031	Pkg2121102032	Pkg2121101033	Pkg2231101031	Pkg2221101031	Pkg2121101033	Pkg2131101032	Pkg2121102033	Pkg2231102031
GHGI [kg/m2]	1.07	1.07	3.92	4.12	1.07	1.06	3.91	3.92	4.12	1.06
% ICC	3.3%	3.4%	3.1%	3.1%	3.4%	3.4%	3.2%	3.2%	3.1%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	108.9	108.1	111.4	109.6	107.5	108.5	109.6	110.8	108.8	106.7
Output: MEUI [kWh/(m2 * yr)]	67	66.7	74.6	74.9	66.4	66	73.8	74.3	74.6	66.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2210.0%	2260.0%	2030.0%	2150.0%	2310.0%	2240.0%	2150.0%	2070.0%	2210.0%	2360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14784	14716	12854	12655	14639	14538	12656	12781	12581	14557
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,084.54	$ 2,074.98	$ 1,812.44	$ 1,784.34	$ 2,064.14	$ 2,049.9	$ 1,784.47	$ 1,802.09	$ 1,773.88	$ 2,052.54
Annual savings in carbon tax for electricity [$/year]	$ 7.39	$ 7.36	$ 6.43	$ 6.33	$ 7.32	$ 7.27	$ 6.33	$ 6.39	$ 6.29	$ 7.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,091.94	$ 2,082.34	$ 1,818.87	$ 1,790.67	$ 2,071.46	$ 2,057.17	$ 1,790.8	$ 1,808.48	$ 1,780.17	$ 2,059.82
Annual savings in GHG from electricity savings [kg CO2e/year]	162.6	161.9	141.4	139.2	161	159.9	139.2	140.6	138.4	160.1
Annual savings in natural gas [m3/year]	174.45	174.45	161.06	160.1	174.45	174.45	161.06	161.06	160.1	174.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,616.28	$ 1,616.28	$ 1,492.21	$ 1,483.34	$ 1,616.28	$ 1,616.28	$ 1,492.21	$ 1,492.21	$ 1,483.34	$ 1,616.28
Annual savings in carbon tax for natural gas [$/year]	$ 403.42	$ 403.42	$ 372.45	$ 370.23	$ 403.42	$ 403.42	$ 372.45	$ 372.45	$ 370.23	$ 403.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,019.69	$ 2,019.69	$ 1,864.66	$ 1,853.58	$ 2,019.69	$ 2,019.69	$ 1,864.66	$ 1,864.66	$ 1,853.58	$ 2,019.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	8964.8	8964.8	8276.6	8227.4	8964.8	8964.8	8276.6	8276.6	8227.4	8964.8
Net Present Value [$]	$ 16,178.03	$ 16,224.21	$ 13,202.55	$ 12,823.97	$ 16,260.88	$ 16,095.55	$ 12,911.12	$ 13,248.16	$ 12,853.73	$ 16,269.82
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 8,432.37	$ 8,432.37	$ 5,757.78	$ 5,757.78	$ 8,432.37	$ 8,432.37	$ 5,757.78	$ 5,757.78	$ 5,757.78	$ 8,432.37
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	HRV sre 60	HRV sre 75	NA	NA	HRV sre 75	HRV sre 60	HRV sre 75	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$ 1,360.	$ 1,800.	$.	$.	$ 1,800.	$ 1,360.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$.

MEDIUM 50SAR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,561.84	$ 16,782.58	$ 17,237.91	$ 17,017.17	$ 17,111.84	$ 17,332.58	$ 17,787.91	$ 17,567.17	$ 17,411.84	$ 17,632.58
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,875.88	$ 25,207.44	$ 25,891.34	$ 25,559.79	$ 25,701.98	$ 26,033.54	$ 26,717.44	$ 26,385.89	$ 26,152.58	$ 26,484.14
Net Present Value [$]	$ 10,710.59	$ 10,743.63	$ 10,792.16	$ 10,792.9	$ 10,938.97	$ 10,972.38	$ 11,020.73	$ 11,021.64	$ 11,026.3	$ 11,059.52
Incremental dollars per GHG saving	$ 2.06	$ 2.09	$ 2.15	$ 2.12	$ 2.11	$ 2.14	$ 2.2	$ 2.17	$ 2.14	$ 2.16
Auxiliary Energy Required Heating [GJ/yr]	86.5	85.8	84.6	85.3	86.5	85.8	84.7	85.3	86.5	85.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	14.3	14.3	14.3	13.4	13.4
Annual Energy Space Heating [GJ/yr]	43.4	43.2	42.6	42.9	43.4	43.2	42.6	42.9	43.4	43.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	86.6	86.3	85.8	86.1	85.2	84.9	84.3	84.6	84.2	83.9
Design Heating Load [W]	15686.8	15580	15445.1	15551.8	15686.8	15580	15445.1	15551.8	15686.8	15580
Annual Energy Electricity [kWh/yr]	19669.8	19596.9	19438.9	19524.9	19671.1	19598.3	19440.2	19526.3	19672.1	19599.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,719.96	$ 2,709.65	$ 2,687.29	$ 2,699.46	$ 2,720.15	$ 2,709.84	$ 2,687.47	$ 2,699.66	$ 2,720.29	$ 2,709.97
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	385.1	385.1	385.1	359.4	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 166.12	$ 166.12	$ 155.03	$ 155.03
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	18103	21235	20965	17834	18104	21236	20966	17835	18105
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2221101031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	4.39	4.38	4.37	4.38	4.07	4.07	4.06	4.06	3.86	3.86
% ICC	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.3%	3.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	102.5	101.7	100.3	101.1	102.5	101.7	100.3	101.1	102.5	101.7
Output: MEUI [kWh/(m2 * yr)]	72.1	71.8	71.1	71.5	70.4	70.1	69.4	69.7	69.2	68.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2660.0%	2720.0%	2820.0%	2770.0%	2660.0%	2720.0%	2820.0%	2770.0%	2660.0%	2720.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11582	11509	11351	11437	11583	11510	11352	11438	11584	11511
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,633.02	$ 1,622.74	$ 1,600.46	$ 1,612.59	$ 1,633.2	$ 1,622.94	$ 1,600.65	$ 1,612.79	$ 1,633.34	$ 1,623.07
Annual savings in carbon tax for electricity [$/year]	$ 5.79	$ 5.75	$ 5.68	$ 5.72	$ 5.79	$ 5.76	$ 5.68	$ 5.72	$ 5.79	$ 5.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,638.81	$ 1,628.5	$ 1,606.14	$ 1,618.31	$ 1,638.99	$ 1,628.69	$ 1,606.32	$ 1,618.51	$ 1,639.14	$ 1,628.82
Annual savings in GHG from electricity savings [kg CO2e/year]	127.4	126.6	124.9	125.8	127.4	126.6	124.9	125.8	127.4	126.6
Annual savings in natural gas [m3/year]	158.66	158.66	158.66	158.66	160.1	160.1	160.1	160.1	161.06	161.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,483.34	$ 1,483.34	$ 1,483.34	$ 1,483.34	$ 1,492.21	$ 1,492.21
Annual savings in carbon tax for natural gas [$/year]	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 370.23	$ 370.23	$ 370.23	$ 370.23	$ 372.45	$ 372.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,853.58	$ 1,853.58	$ 1,853.58	$ 1,853.58	$ 1,864.66	$ 1,864.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	8153.2	8153.2	8153.2	8153.2	8227.4	8227.4	8227.4	8227.4	8276.6	8276.6
Net Present Value [$]	$ 10,710.59	$ 10,743.63	$ 10,792.16	$ 10,792.9	$ 10,938.97	$ 10,972.38	$ 11,020.73	$ 11,021.64	$ 11,026.3	$ 11,059.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	10.51	10.51	8.78	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$ 550.	$ 850.	$ 850.

MEDIUM 50SAR Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 33,598.17	$ 33,642.84	$ 33,779.59	$ 33,877.43	$ 34,059.05	$ 34,098.17	$ 34,103.72	$ 34,148.17	$ 34,192.84	$ 34,234.92
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,464.45	$ 50,531.55	$ 50,736.94	$ 50,883.9	$ 51,156.69	$ 51,215.45	$ 51,223.79	$ 51,290.55	$ 51,357.65	$ 51,420.85
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 19,608.67	$ 19,403.6	$ 19,760.32	$ 19,466.59	$ 19,831.65	$ 19,528.01	$ 19,599.33	$ 19,701.57
Incremental dollars per GHG saving	$ 4.17	$ 4.17	$ 4.19	$ 4.2	$ 4.23	$ 4.23	$ 4.23	$ 4.2	$ 4.2	$ 4.25
Auxiliary Energy Required Heating [GJ/yr]	58.7	58.5	58.9	58.1	58.7	57.4	58.5	58.7	58.5	57.8
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	15.8	15.8	15.8	14.3	14.3	15.8
Annual Energy Space Heating [GJ/yr]	30.4	30.5	30.6	30.2	30.4	30	30.5	30.4	30.5	30.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	74.8	74.8	75	74.5	74.8	74.3	74.8	73.3	73.4	74.5
Design Heating Load [W]	11545.3	11635.3	11617.4	11607.1	11545.3	11500.3	11635.3	11545.3	11635.3	11482.4
Annual Energy Electricity [kWh/yr]	16388.5	16398.9	16438.2	16320.5	16388.5	16259.2	16398.9	16389.9	16400.2	16297.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,255.66	$ 2,257.13	$ 2,262.69	$ 2,246.04	$ 2,255.66	$ 2,237.36	$ 2,257.13	$ 2,255.86	$ 2,257.31	$ 2,242.77
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	423.9	423.9	423.9	385.1	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45715	43789	43987	45517	46363	45733	44437	45716	43790	45931
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg3331203053	Pkg3331201054	Pkg3331302053	Pkg3331202054	Pkg3321302054	Pkg3331202053	Pkg3321202054	Pkg3331203053
GHGI [kg/m2]	4.23	4.23	4.23	4.23	4.23	4.23	4.23	3.91	3.92	4.23
% ICC	6.4%	6.4%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69.5	69.4	69.8	68.8	69.5	68.1	69.4	69.5	69.4	68.5
Output: MEUI [kWh/(m2 * yr)]	58	58.1	58.2	57.7	58	57.5	58.1	56.3	56.4	57.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5040.0%	5000.0%	5070.0%	5020.0%	5130.0%	5040.0%	5020.0%	5040.0%	5100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8300	8311	8350	8232	8300	8171	8311	8302	8312	8209
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,170.36	$ 1,171.82	$ 1,177.36	$ 1,160.77	$ 1,170.36	$ 1,152.13	$ 1,171.82	$ 1,170.55	$ 1,172.01	$ 1,157.51
Annual savings in carbon tax for electricity [$/year]	$ 4.15	$ 4.16	$ 4.18	$ 4.12	$ 4.15	$ 4.09	$ 4.16	$ 4.15	$ 4.16	$ 4.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,174.51	$ 1,175.98	$ 1,181.54	$ 1,164.88	$ 1,174.51	$ 1,156.21	$ 1,175.98	$ 1,174.7	$ 1,176.16	$ 1,161.62
Annual savings in GHG from electricity savings [kg CO2e/year]	91.3	91.4	91.9	90.6	91.3	89.9	91.4	91.3	91.4	90.3
Annual savings in natural gas [m3/year]	158.66	158.66	158.66	158.66	158.66	158.66	158.66	160.1	160.1	158.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,483.34	$ 1,483.34	$ 1,469.95
Annual savings in carbon tax for natural gas [$/year]	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 370.23	$ 370.23	$ 366.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,853.58	$ 1,853.58	$ 1,836.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	8153.2	8153.2	8153.2	8153.2	8153.2	8153.2	8153.2	8227.4	8227.4	8153.2
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 19,608.67	$ 19,403.6	$ 19,760.32	$ 19,466.59	$ 19,831.65	$ 19,528.01	$ 19,599.33	$ 19,701.57
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	14.09	8.78	10.51	10.51	10.51	10.51	10.51	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 1,163.13	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.

MEDIUM 50SAR Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,598.17	$ 33,642.84	$ 36,969.8	$ 33,779.59	$ 34,148.17	$ 33,877.43	$ 34,192.84	$ 34,448.17	$ 37,266.08	$ 34,492.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,464.45	$ 50,531.55	$ 55,528.64	$ 50,736.94	$ 51,290.55	$ 50,883.9	$ 51,357.65	$ 51,741.15	$ 55,973.65	$ 51,808.25
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 25,676.14	$ 19,608.67	$ 19,528.01	$ 19,403.6	$ 19,599.33	$ 19,615.15	$ 25,972.42	$ 19,686.3
Incremental dollars per GHG saving	$ 4.17	$ 4.17	$ 4.18	$ 4.19	$ 4.2	$ 4.2	$ 4.2	$ 4.21	$ 4.21	$ 4.21
Auxiliary Energy Required Heating [GJ/yr]	58.7	58.5	58.9	58.9	58.7	58.1	58.5	58.7	58.9	58.5
Annual Energy DHW [GJ/yr]	15.8	15.8	9.2	15.8	14.3	15.8	14.3	13.4	9.2	13.4
Annual Energy Space Heating [GJ/yr]	30.4	30.5	30.4	30.6	30.4	30.2	30.5	30.4	30.4	30.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	74.8	74.8	68.2	75	73.3	74.5	73.4	72.4	68.2	72.4
Design Heating Load [W]	11545.3	11635.3	11285.2	11617.4	11545.3	11607.1	11635.3	11545.3	11285.2	11635.3
Annual Energy Electricity [kWh/yr]	16388.5	16398.9	18935	16438.2	16389.9	16320.5	16400.2	16390.8	18935	16401.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,255.66	$ 2,257.13	$ 2,615.99	$ 2,262.69	$ 2,255.86	$ 2,246.04	$ 2,257.31	$ 2,255.98	$ 2,615.99	$ 2,257.44
Annual Energy Natural Gas [m3/yr]	423.9	423.9	0	423.9	385.1	423.9	385.1	359.4	0	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$.	$ 182.86	$ 166.12	$ 182.86	$ 166.12	$ 155.03	$.	$ 155.03
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45715	43789	51802	43987	45716	45517	43790	45717	52090	43791
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg4331303054	Pkg3321203053	Pkg3331202053	Pkg3331201054	Pkg3321202054	Pkg3331202053	Pkg4331403054	Pkg3321202054
GHGI [kg/m2]	4.23	4.23	0.89	4.23	3.91	4.23	3.92	3.7	0.89	3.71
% ICC	6.4%	6.4%	7.1%	6.5%	6.5%	6.5%	6.5%	6.6%	7.1%	6.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69.5	69.4	69.8	69.8	69.5	68.8	69.4	69.5	69.8	69.4
Output: MEUI [kWh/(m2 * yr)]	58	58.1	50.2	58.2	56.3	57.7	56.4	55.2	50.2	55.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5040.0%	5000.0%	5000.0%	5020.0%	5070.0%	5040.0%	5020.0%	5000.0%	5040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8300	8311	10847	8350	8302	8232	8312	8303	10847	8313
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,170.36	$ 1,171.82	$ 1,529.41	$ 1,177.36	$ 1,170.55	$ 1,160.77	$ 1,172.01	$ 1,170.68	$ 1,529.41	$ 1,172.13
Annual savings in carbon tax for electricity [$/year]	$ 4.15	$ 4.16	$ 5.42	$ 4.18	$ 4.15	$ 4.12	$ 4.16	$ 4.15	$ 5.42	$ 4.16
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,174.51	$ 1,175.98	$ 1,534.84	$ 1,181.54	$ 1,174.7	$ 1,164.88	$ 1,176.16	$ 1,174.83	$ 1,534.84	$ 1,176.29
Annual savings in GHG from electricity savings [kg CO2e/year]	91.3	91.4	119.3	91.9	91.3	90.6	91.4	91.3	119.3	91.4
Annual savings in natural gas [m3/year]	158.66	158.66	174.45	158.66	160.1	158.66	160.1	161.06	174.45	161.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,469.95	$ 1,469.95	$ 1,616.28	$ 1,469.95	$ 1,483.34	$ 1,469.95	$ 1,483.34	$ 1,492.21	$ 1,616.28	$ 1,492.21
Annual savings in carbon tax for natural gas [$/year]	$ 366.89	$ 366.89	$ 403.42	$ 366.89	$ 370.23	$ 366.89	$ 370.23	$ 372.45	$ 403.42	$ 372.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,836.84	$ 1,836.84	$ 2,019.69	$ 1,836.84	$ 1,853.58	$ 1,836.84	$ 1,853.58	$ 1,864.66	$ 2,019.69	$ 1,864.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	8153.2	8153.2	8964.8	8153.2	8227.4	8153.2	8227.4	8276.6	8964.8	8276.6
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 25,676.14	$ 19,608.67	$ 19,528.01	$ 19,403.6	$ 19,599.33	$ 19,615.15	$ 25,972.42	$ 19,686.3
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	14.09	14.09	10.51	8.78	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 1,163.13	$ 1,163.13	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 2,213.87	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.

MEDIUM 50SAR Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,598.17	$ 33,642.84	$ 33,877.43	$ 34,098.17	$ 34,148.17	$ 34,192.84	$ 33,779.59	$ 34,448.17	$ 34,427.43	$ 34,492.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,464.45	$ 50,531.55	$ 50,883.9	$ 51,215.45	$ 51,290.55	$ 51,357.65	$ 50,736.94	$ 51,741.15	$ 51,710.	$ 51,808.25
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 19,403.6	$ 19,466.59	$ 19,528.01	$ 19,599.33	$ 19,608.67	$ 19,615.15	$ 19,631.98	$ 19,686.3
Incremental dollars per GHG saving	$ 4.17	$ 4.17	$ 4.2	$ 4.23	$ 4.2	$ 4.2	$ 4.19	$ 4.21	$ 4.23	$ 4.21
Auxiliary Energy Required Heating [GJ/yr]	58.7	58.5	58.1	57.4	58.7	58.5	58.9	58.7	58.1	58.5
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	15.8	14.3	14.3	15.8	13.4	14.3	13.4
Annual Energy Space Heating [GJ/yr]	30.4	30.5	30.2	30	30.4	30.5	30.6	30.4	30.2	30.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	74.8	74.8	74.5	74.3	73.3	73.4	75	72.4	73.1	72.4
Design Heating Load [W]	11545.3	11635.3	11607.1	11500.3	11545.3	11635.3	11617.4	11545.3	11607.1	11635.3
Annual Energy Electricity [kWh/yr]	16388.5	16398.9	16320.5	16259.2	16389.9	16400.2	16438.2	16390.8	16321.8	16401.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,255.66	$ 2,257.13	$ 2,246.04	$ 2,237.36	$ 2,255.86	$ 2,257.31	$ 2,262.69	$ 2,255.98	$ 2,246.22	$ 2,257.44
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	423.9	385.1	385.1	423.9	359.4	385.1	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 166.12	$ 182.86	$ 155.03	$ 166.12	$ 155.03
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45715	43789	45517	45733	45716	43790	43987	45717	45518	43791
Upgrade Package List	Pkg3331202053	Pkg3321202054	Pkg3331201054	Pkg3331202054	Pkg3331202053	Pkg3321202054	Pkg3321203053	Pkg3331202053	Pkg3331201054	Pkg3321202054
GHGI [kg/m2]	4.23	4.23	4.23	4.23	3.91	3.92	4.23	3.7	3.91	3.71
% ICC	6.4%	6.4%	6.5%	6.5%	6.5%	6.5%	6.5%	6.6%	6.6%	6.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69.5	69.4	68.8	68.1	69.5	69.4	69.8	69.5	68.8	69.4
Output: MEUI [kWh/(m2 * yr)]	58	58.1	57.7	57.5	56.3	56.4	58.2	55.2	56	55.2
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	5020.0%	5040.0%	5070.0%	5130.0%	5020.0%	5040.0%	5000.0%	5020.0%	5070.0%	5040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8300	8311	8232	8171	8302	8312	8350	8303	8234	8313
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,170.36	$ 1,171.82	$ 1,160.77	$ 1,152.13	$ 1,170.55	$ 1,172.01	$ 1,177.36	$ 1,170.68	$ 1,160.95	$ 1,172.13
Annual savings in carbon tax for electricity [$/year]	$ 4.15	$ 4.16	$ 4.12	$ 4.09	$ 4.15	$ 4.16	$ 4.18	$ 4.15	$ 4.12	$ 4.16
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,174.51	$ 1,175.98	$ 1,164.88	$ 1,156.21	$ 1,174.7	$ 1,176.16	$ 1,181.54	$ 1,174.83	$ 1,165.07	$ 1,176.29
Annual savings in GHG from electricity savings [kg CO2e/year]	91.3	91.4	90.6	89.9	91.3	91.4	91.9	91.3	90.6	91.4
Annual savings in natural gas [m3/year]	158.66	158.66	158.66	158.66	160.1	160.1	158.66	161.06	160.1	161.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,469.95	$ 1,483.34	$ 1,483.34	$ 1,469.95	$ 1,492.21	$ 1,483.34	$ 1,492.21
Annual savings in carbon tax for natural gas [$/year]	$ 366.89	$ 366.89	$ 366.89	$ 366.89	$ 370.23	$ 370.23	$ 366.89	$ 372.45	$ 370.23	$ 372.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,836.84	$ 1,853.58	$ 1,853.58	$ 1,836.84	$ 1,864.66	$ 1,853.58	$ 1,864.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	8153.2	8153.2	8153.2	8153.2	8227.4	8227.4	8153.2	8276.6	8227.4	8276.6
Net Present Value [$]	$ 19,299.44	$ 19,370.77	$ 19,403.6	$ 19,466.59	$ 19,528.01	$ 19,599.33	$ 19,608.67	$ 19,615.15	$ 19,631.98	$ 19,686.3
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	8.78	10.51	10.51	10.51	14.09	10.51	8.78	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 305.64	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 550.	$ 850.

MEDIUM 50SAR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,962.45	$ 16,183.06	$ 16,417.92	$ 16,424.26	$ 16,512.45	$ 16,562.45	$ 16,638.53	$ 16,659.12	$ 16,733.06	$ 16,783.06
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,975.6	$ 24,306.96	$ 24,659.72	$ 24,669.24	$ 24,801.7	$ 24,876.8	$ 24,991.07	$ 25,022.	$ 25,133.06	$ 25,208.16
Net Present Value [$]	$ 18,671.41	$ 18,584.6	$ 18,588.15	$ 20,045.33	$ 18,824.44	$ 16,787.95	$ 18,548.58	$ 20,034.26	$ 18,737.64	$ 16,677.53
Incremental dollars per GHG saving	$ 1.74	$ 1.76	$ 1.79	$ 1.79	$ 1.78	$ 1.7	$ 1.81	$ 1.81	$ 1.8	$ 1.72
Auxiliary Energy Required Heating [GJ/yr]	111.3	110.5	109.9	115.9	111.3	112	109.1	115.3	110.5	111.3
Annual Energy DHW [GJ/yr]	27.1	27.1	27	27.1	25.3	16.2	27	27.1	25.3	16.2
Annual Energy Space Heating [GJ/yr]	62.6	62.2	61.8	64.4	62.6	62.5	61.5	64	62.2	62.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	118	117.6	117.2	119.3	116.3	107.1	116.9	119	115.8	106.6
Design Heating Load [W]	17368.7	17254.4	17220.9	17254.4	17368.7	16921.6	17106.6	17220.9	17254.4	16807.4
Annual Energy Electricity [kWh/yr]	25263.5	25143.7	25056.1	25614.5	25263.5	25251.4	24955	25520.9	25143.7	25122.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,511.47	$ 3,494.52	$ 3,482.12	$ 3,561.14	$ 3,511.47	$ 3,509.76	$ 3,467.82	$ 3,547.89	$ 3,494.52	$ 3,491.56
Annual Energy Natural Gas [m3/yr]	726.9	727	726.3	727.9	679.5	434.1	726.3	727.3	679.6	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 313.56	$ 313.6	$ 313.3	$ 313.99	$ 293.11	$ 187.26	$ 313.3	$ 313.73	$ 293.16	$ 187.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17830	18100	20962	18046	17831	17833	21232	20908	18101	18103
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2231101031	Pkg2221102021	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2231101021	Pkg2221102031	Pkg2221102031
GHGI [kg/m2]	7.12	7.12	7.11	7.15	6.74	4.73	7.1	7.14	6.73	4.72
% ICC	3.1%	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	131.9	130.9	130.2	137.3	131.9	132.8	129.3	136.6	130.9	131.9
Output: MEUI [kWh/(m2 * yr)]	109.1	108.6	108.2	110.8	107	96.1	107.8	110.4	106.5	95.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1360.0%	1420.0%	1470.0%	1000.0%	1360.0%	1300.0%	1530.0%	1050.0%	1420.0%	1360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16994	16874	16787	17345	16994	16982	16686	17251	16874	16853
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,396.15	$ 2,379.26	$ 2,366.91	$ 2,445.64	$ 2,396.15	$ 2,394.45	$ 2,352.66	$ 2,432.45	$ 2,379.26	$ 2,376.32
Annual savings in carbon tax for electricity [$/year]	$ 8.5	$ 8.44	$ 8.39	$ 8.67	$ 8.5	$ 8.49	$ 8.34	$ 8.63	$ 8.44	$ 8.43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,404.65	$ 2,387.7	$ 2,375.3	$ 2,454.32	$ 2,404.65	$ 2,402.94	$ 2,361.	$ 2,441.07	$ 2,387.7	$ 2,384.74
Annual savings in GHG from electricity savings [kg CO2e/year]	186.9	185.6	184.7	190.8	186.9	186.8	183.5	189.8	185.6	185.4
Annual savings in natural gas [m3/year]	182.56	182.55	182.58	182.52	184.32	193.47	182.58	182.54	184.32	193.47
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,691.4	$ 1,691.36	$ 1,691.6	$ 1,691.05	$ 1,707.76	$ 1,792.47	$ 1,691.6	$ 1,691.26	$ 1,707.72	$ 1,792.47
Annual savings in carbon tax for natural gas [$/year]	$ 422.16	$ 422.16	$ 422.22	$ 422.08	$ 426.25	$ 447.39	$ 422.22	$ 422.13	$ 426.24	$ 447.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,113.56	$ 2,113.52	$ 2,113.82	$ 2,113.13	$ 2,134.01	$ 2,239.86	$ 2,113.82	$ 2,113.39	$ 2,133.96	$ 2,239.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	9381.4	9381.2	9382.6	9379.5	9472.2	9942.1	9382.6	9380.7	9472	9942.1
Net Present Value [$]	$ 18,671.41	$ 18,584.6	$ 18,588.15	$ 20,045.33	$ 18,824.44	$ 16,787.95	$ 18,548.58	$ 20,034.26	$ 18,737.64	$ 16,677.53
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	10.51	8.78	8.78	10.51	8.78	10.51	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,733.6	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$.

MEDIUM 50SAR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,562.45	$ 18,012.53	$ 16,783.06	$ 15,962.45	$ 17,112.45	$ 17,017.92	$ 18,562.53	$ 16,183.06	$ 17,412.45	$ 17,333.06
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,876.8	$ 27,054.82	$ 25,208.16	$ 23,975.6	$ 25,702.9	$ 25,560.92	$ 27,880.92	$ 24,306.96	$ 26,153.5	$ 26,034.26
Net Present Value [$]	$ 16,787.95	$ 22,614.9	$ 16,677.53	$ 18,671.41	$ 17,003.47	$ 16,682.88	$ 22,492.99	$ 18,584.6	$ 17,080.85	$ 16,893.06
Incremental dollars per GHG saving	$ 1.7	$ 1.71	$ 1.72	$ 1.74	$ 1.74	$ 1.74	$ 1.76	$ 1.76	$ 1.76	$ 1.76
Auxiliary Energy Required Heating [GJ/yr]	112	115.9	111.3	111.3	112.1	110.7	115.5	110.5	112.1	111.3
Annual Energy DHW [GJ/yr]	16.2	9.3	16.2	27.1	14.7	16.2	8.5	27.1	13.7	14.7
Annual Energy Space Heating [GJ/yr]	62.5	64.4	62.1	62.6	62.6	61.8	64.3	62.2	62.6	62.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	107.1	102.1	106.6	118	105.6	106.3	101.2	117.6	104.6	105.1
Design Heating Load [W]	16921.6	17106.6	16807.4	17368.7	16921.6	16773.8	17106.6	17254.4	16921.6	16807.4
Annual Energy Electricity [kWh/yr]	25251.4	28363.9	25122.8	25263.5	25253	25033.7	28102.9	25143.7	25254	25124.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,509.76	$ 3,950.18	$ 3,491.56	$ 3,511.47	$ 3,509.98	$ 3,478.95	$ 3,913.25	$ 3,494.52	$ 3,510.13	$ 3,491.79
Annual Energy Natural Gas [m3/yr]	434.1	0	434.1	726.9	393.7	434.1	0	727	366.8	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$.	$ 187.26	$ 313.56	$ 169.83	$ 187.26	$.	$ 313.6	$ 158.22	$ 169.83
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	21238	18103	17830	17834	20965	21239	18100	17835	18104
Upgrade Package List	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2231101031	Pkg2231102031	Pkg2221102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	4.73	1.33	4.72	7.12	4.4	4.72	1.32	7.12	4.18	4.4
% ICC	3.2%	3.4%	3.2%	3.1%	3.3%	3.3%	3.6%	3.1%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	132.8	137.4	131.9	131.9	132.8	131.1	136.9	130.9	132.8	131.9
Output: MEUI [kWh/(m2 * yr)]	96.1	90.2	95.6	109.1	94.3	95.2	89.1	108.6	93.2	93.8
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1300.0%	1000.0%	1360.0%	1360.0%	1300.0%	1410.0%	1030.0%	1420.0%	1300.0%	1360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16982	20094	16853	16994	16984	16764	19833	16874	16984	16855
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,394.45	$ 2,833.31	$ 2,376.32	$ 2,396.15	$ 2,394.67	$ 2,363.75	$ 2,796.51	$ 2,379.26	$ 2,394.81	$ 2,376.54
Annual savings in carbon tax for electricity [$/year]	$ 8.49	$ 10.05	$ 8.43	$ 8.5	$ 8.49	$ 8.38	$ 9.92	$ 8.44	$ 8.49	$ 8.43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,402.94	$ 2,843.36	$ 2,384.74	$ 2,404.65	$ 2,403.17	$ 2,372.13	$ 2,806.43	$ 2,387.7	$ 2,403.31	$ 2,384.97
Annual savings in GHG from electricity savings [kg CO2e/year]	186.8	221	185.4	186.9	186.8	184.4	218.2	185.6	186.8	185.4
Annual savings in natural gas [m3/year]	193.47	209.64	193.47	182.56	194.97	193.47	209.64	182.55	195.97	194.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,792.47	$ 1,942.32	$ 1,792.47	$ 1,691.4	$ 1,806.42	$ 1,792.47	$ 1,942.32	$ 1,691.36	$ 1,815.7	$ 1,806.42
Annual savings in carbon tax for natural gas [$/year]	$ 447.39	$ 484.79	$ 447.39	$ 422.16	$ 450.87	$ 447.39	$ 484.79	$ 422.16	$ 453.19	$ 450.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,239.86	$ 2,427.12	$ 2,239.86	$ 2,113.56	$ 2,257.29	$ 2,239.86	$ 2,427.12	$ 2,113.52	$ 2,268.89	$ 2,257.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	9942.1	10773.2	9942.1	9381.4	10019.4	9942.1	10773.2	9381.2	10070.9	10019.4
Net Present Value [$]	$ 16,787.95	$ 22,614.9	$ 16,677.53	$ 18,671.41	$ 17,003.47	$ 16,682.88	$ 22,492.99	$ 18,584.6	$ 17,080.85	$ 16,893.06
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	10.51	8.78	8.78	8.78	10.51	10.51	8.78	10.51
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 305.47	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 600.	$.	$ 600.	$ 600.	$ 1,374.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 550.

MEDIUM 50SAR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 32,410.59	$ 32,435.92	$ 32,460.59	$ 32,505.12	$ 32,760.59	$ 32,805.12	$ 32,960.59	$ 33,260.59	$ 32,706.99	$ 32,756.99
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 48,680.71	$ 48,718.75	$ 48,755.81	$ 48,822.69	$ 49,206.41	$ 49,273.29	$ 49,506.81	$ 49,957.41	$ 49,125.9	$ 49,201.
Net Present Value [$]	$ 5,649.98	$ 5,652.23	$ 5,681.59	$ 5,742.81	$ 5,758.06	$ 5,820.43	$ 5,864.34	$ 5,940.62	$ 5,946.38	$ 5,977.99
Incremental dollars per GHG saving	$ 5.44	$ 5.44	$ 5.45	$ 5.46	$ 5.45	$ 5.46	$ 5.47	$ 5.47	$ 5.49	$ 5.5
Auxiliary Energy Required Heating [GJ/yr]	74.6	76.8	75.9	76	75.9	76	74.6	74.7	74.6	75.9
Annual Energy DHW [GJ/yr]	16.2	13.7	14.7	14.7	13.7	13.7	14.7	13.7	16.2	14.7
Annual Energy Space Heating [GJ/yr]	79.1	81.4	80.4	80.5	80.4	80.5	79.1	79.1	79.1	80.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	122.6	122.4	122.4	122.5	121.4	121.5	121.1	120.1	122.6	122.4
Design Heating Load [W]	11757.9	12243.9	11806	11905.7	11806	11905.7	11757.9	11757.9	11757.9	11806
Annual Energy Electricity [kWh/yr]	7986	7997.5	7992.8	7993.2	7992.9	7993.3	7986.1	7986.1	7986	7992.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,066.7	$ 1,068.33	$ 1,067.67	$ 1,067.72	$ 1,067.68	$ 1,067.74	$ 1,066.72	$ 1,066.72	$ 1,066.7	$ 1,067.67
Annual Energy Natural Gas [m3/yr]	2518.9	2512.6	2514.6	2516.5	2487.9	2489.9	2478.8	2452.1	2518.9	2514.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,086.57	$ 1,083.85	$ 1,084.71	$ 1,085.53	$ 1,073.19	$ 1,074.06	$ 1,069.27	$ 1,057.75	$ 1,086.57	$ 1,084.71
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	51646	45942	51629	51071	51630	51072	51647	51648	51934	51917
Upgrade Package List	Pkg4331302054	Pkg3331203054	Pkg4331302053	Pkg4321302054	Pkg4331302053	Pkg4321302054	Pkg4331302054	Pkg4331302054	Pkg4331402054	Pkg4331402053
GHGI [kg/m2]	20.95	20.9	20.92	20.93	20.7	20.71	20.62	20.4	20.95	20.92
% ICC	6.2%	6.2%	6.2%	6.2%	6.3%	6.3%	6.3%	6.4%	6.3%	6.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	88.4	91	90	90.1	90	90.1	88.5	88.5	88.4	90
Output: MEUI [kWh/(m2 * yr)]	114.9	114.6	114.7	114.8	113.5	113.6	113.1	111.9	114.9	114.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	4210.0%	4040.0%	4110.0%	4100.0%	4110.0%	4100.0%	4210.0%	4200.0%	4210.0%	4110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	284	272	277	276	277	276	283	283	284	277
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 39.97	$ 38.35	$ 39.01	$ 38.96	$ 39.	$ 38.94	$ 39.96	$ 39.96	$ 39.97	$ 39.01
Annual savings in carbon tax for electricity [$/year]	$ .14	$ .14	$ .14	$ .14	$ .14	$ .14	$ .14	$ .14	$ .14	$ .14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 40.12	$ 38.49	$ 39.15	$ 39.1	$ 39.14	$ 39.08	$ 40.1	$ 40.1	$ 40.12	$ 39.15
Annual savings in GHG from electricity savings [kg CO2e/year]	3.1	3	3	3	3	3	3.1	3.1	3.1	3
Annual savings in natural gas [m3/year]	115.79	116.02	115.95	115.88	116.94	116.87	117.28	118.28	115.79	115.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,072.79	$ 1,074.96	$ 1,074.27	$ 1,073.62	$ 1,083.49	$ 1,082.8	$ 1,086.63	$ 1,095.85	$ 1,072.79	$ 1,074.27
Annual savings in carbon tax for natural gas [$/year]	$ 267.76	$ 268.31	$ 268.13	$ 267.97	$ 270.43	$ 270.26	$ 271.22	$ 273.52	$ 267.76	$ 268.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,340.55	$ 1,343.27	$ 1,342.41	$ 1,341.59	$ 1,353.93	$ 1,353.06	$ 1,357.85	$ 1,369.37	$ 1,340.55	$ 1,342.41
Annual savings in GHG from natural gas savings [kg CO2e/year]	5950.3	5962.4	5958.5	5954.9	6009.7	6005.8	6027.1	6078.2	5950.3	5958.5
Net Present Value [$]	$ 5,649.98	$ 5,652.23	$ 5,681.59	$ 5,742.81	$ 5,758.06	$ 5,820.43	$ 5,864.34	$ 5,940.62	$ 5,946.38	$ 5,977.99
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	14.09	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 1,162.47	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 787.	$ 787.	$ 787.	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,918.36	$ 1,457.3	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 1,918.36	$ 2,214.76	$ 2,214.76
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$.	$ 550.

MEDIUM 50SAR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 21,090.36	$ 21,325.22	$ 21,369.75	$ 21,390.36	$ 21,495.83	$ 21,545.83	$ 21,551.42	$ 21,590.36	$ 21,602.95	$ 21,625.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,677.72	$ 32,030.48	$ 32,097.36	$ 32,128.32	$ 32,286.74	$ 32,361.84	$ 32,370.23	$ 32,428.72	$ 32,447.63	$ 32,481.08
Net Present Value [$]	$ 18,101.11	$ 18,077.79	$ 18,254.15	$ 18,178.85	$ 17,947.11	$ 18,044.06	$ 18,562.17	$ 18,216.58	$ 17,855.03	$ 18,155.54
Incremental dollars per GHG saving	$ 2.14	$ 2.17	$ 2.17	$ 2.16	$ 2.2	$ 2.19	$ 2.19	$ 2.19	$ 2.21	$ 2.19
Auxiliary Energy Required Heating [GJ/yr]	102.7	102.1	102.1	102.7	100	101.3	102.7	101.4	99.2	102.1
Annual Energy DHW [GJ/yr]	14.7	14.7	14.7	13.7	16.2	14.7	14.7	14.7	16.2	13.7
Annual Energy Space Heating [GJ/yr]	57.6	57.2	57.4	57.6	56.3	56.8	57.6	57	56	57.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	101.5	101.2	101.4	100.5	101.8	100.8	101.5	101	101.5	100.2
Design Heating Load [W]	14997.3	14963.7	15063.4	14997.3	14801.3	14849.4	14997.3	14949.2	14941.4	14963.7
Annual Energy Electricity [kWh/yr]	24134.2	24033.9	24085.1	24135.3	23785.4	23935.1	24134.2	23984.8	23708	24035
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,351.67	$ 3,337.48	$ 3,344.73	$ 3,351.83	$ 3,302.32	$ 3,323.5	$ 3,351.67	$ 3,330.53	$ 3,291.37	$ 3,337.64
Annual Energy Natural Gas [m3/yr]	393.7	393.7	393.7	366.8	434.1	393.7	393.7	393.7	434.1	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 169.83	$ 169.83	$ 169.83	$ 158.22	$ 187.26	$ 169.83	$ 169.83	$ 169.83	$ 187.26	$ 158.22
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35888	37616	35690	35889	37849	37832	36536	35906	27895	37617
Upgrade Package List	Pkg3221202033	Pkg3231201033	Pkg3221201034	Pkg3221202033	Pkg3221202034	Pkg3231202033	Pkg3221302033	Pkg3221202034	Pkg2321201033	Pkg3231201033
GHGI [kg/m2]	4.35	4.34	4.35	4.13	4.66	4.34	4.35	4.34	4.66	4.12
% ICC	4.0%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	121.7	121	121	121.7	118.5	120.1	121.7	120.1	117.6	121
Output: MEUI [kWh/(m2 * yr)]	89.6	89.1	89.4	88.4	89.9	88.7	89.6	88.9	89.5	88
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2030.0%	2070.0%	2070.0%	2030.0%	2240.0%	2140.0%	2030.0%	2130.0%	2300.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15865	15764	15816	15866	15516	15666	15865	15715	15438	15766
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,236.92	$ 2,222.78	$ 2,230.	$ 2,237.08	$ 2,187.74	$ 2,208.85	$ 2,236.92	$ 2,215.86	$ 2,176.83	$ 2,222.94
Annual savings in carbon tax for electricity [$/year]	$ 7.93	$ 7.88	$ 7.91	$ 7.93	$ 7.76	$ 7.83	$ 7.93	$ 7.86	$ 7.72	$ 7.88
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,244.86	$ 2,230.66	$ 2,237.91	$ 2,245.01	$ 2,195.5	$ 2,216.68	$ 2,244.86	$ 2,223.71	$ 2,184.55	$ 2,230.82
Annual savings in GHG from electricity savings [kg CO2e/year]	174.5	173.4	174	174.5	170.7	172.3	174.5	172.9	169.8	173.4
Annual savings in natural gas [m3/year]	194.97	194.97	194.97	195.97	193.47	194.97	194.97	194.97	193.47	195.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,806.42	$ 1,806.42	$ 1,806.42	$ 1,815.7	$ 1,792.47	$ 1,806.42	$ 1,806.42	$ 1,806.42	$ 1,792.47	$ 1,815.7
Annual savings in carbon tax for natural gas [$/year]	$ 450.87	$ 450.87	$ 450.87	$ 453.19	$ 447.39	$ 450.87	$ 450.87	$ 450.87	$ 447.39	$ 453.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,257.29	$ 2,257.29	$ 2,257.29	$ 2,268.89	$ 2,239.86	$ 2,257.29	$ 2,257.29	$ 2,257.29	$ 2,239.86	$ 2,268.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	10019.4	10019.4	10019.4	10070.9	9942.1	10019.4	10019.4	10019.4	9942.1	10070.9
Net Present Value [$]	$ 18,101.11	$ 18,077.79	$ 18,254.15	$ 18,178.85	$ 17,947.11	$ 18,044.06	$ 18,562.17	$ 18,216.58	$ 17,855.03	$ 18,155.54
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	10.51	10.51	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 8,433.05	$ 10,216.25	$ 8,433.05
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 331.53	$ 787.
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 550.	$ 550.	$ 850.	$.	$ 550.	$ 550.	$ 550.	$.	$ 850.

MEDIUM 50SAR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 21,090.36	$ 22,657.56	$ 21,390.36	$ 22,876.95	$ 21,325.22	$ 22,892.42	$ 21,369.75	$ 22,986.95	$ 23,053.03	$ 23,097.56
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,677.72	$ 34,031.66	$ 32,128.32	$ 34,361.18	$ 32,030.48	$ 34,384.41	$ 32,097.36	$ 34,526.4	$ 34,625.65	$ 34,692.54
Net Present Value [$]	$ 18,101.11	$ 23,005.88	$ 18,178.85	$ 22,596.09	$ 18,077.79	$ 23,004.48	$ 18,254.15	$ 22,938.34	$ 23,723.8	$ 22,538.44
Incremental dollars per GHG saving	$ 2.14	$ 2.14	$ 2.16	$ 2.16	$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ 2.18	$ 2.18
Auxiliary Energy Required Heating [GJ/yr]	102.7	102.7	102.7	101	102.1	102.1	102.1	103.1	103	100.2
Annual Energy DHW [GJ/yr]	14.7	9.3	13.7	9.3	14.7	9.3	14.7	8.6	9.3	9.4
Annual Energy Space Heating [GJ/yr]	57.6	57.4	57.6	56.6	57.2	57.1	57.4	57.7	57.9	56.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	101.5	96.2	100.5	95.3	101.2	95.8	101.4	95.6	96.6	94.9
Design Heating Load [W]	14997.3	14777.6	14997.3	14667.4	14963.7	14744	15063.4	14891.9	15126.4	14553.1
Annual Energy Electricity [kWh/yr]	24134.2	26711.5	24135.3	26467.1	24033.9	26619.7	24085.1	26557.3	26836.7	26359
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,351.67	$ 3,716.36	$ 3,351.83	$ 3,681.78	$ 3,337.48	$ 3,703.37	$ 3,344.73	$ 3,694.54	$ 3,734.08	$ 3,666.48
Annual Energy Natural Gas [m3/yr]	393.7	0	366.8	0	393.7	0	393.7	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 169.83	$.	$ 158.22	$.	$ 169.83	$.	$ 169.83	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35888	43648	35889	43450	37616	45376	35690	43433	30058	43666
Upgrade Package List	Pkg3221202033	Pkg3221202032	Pkg3221202033	Pkg3321201033	Pkg3221201033	Pkg3331201032	Pkg3221201034	Pkg3321201032	Pkg2331202033	Pkg3321202033
GHGI [kg/m2]	4.35	1.25	4.13	1.24	4.34	1.25	4.35	1.25	1.26	1.24
% ICC	4.0%	4.3%	4.1%	4.4%	4.1%	4.4%	4.1%	4.4%	4.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	121.7	121.7	121.7	119.7	121	121	121	122.2	122.1	118.7
Output: MEUI [kWh/(m2 * yr)]	89.6	83.2	88.4	82.1	89.1	82.8	89.4	82.5	83.7	81.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2030.0%	2160.0%	2070.0%	2070.0%	2070.0%	2000.0%	2000.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15865	18442	15866	18198	15764	18350	15816	18288	18567	18090
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,236.92	$ 2,600.32	$ 2,237.08	$ 2,565.86	$ 2,222.78	$ 2,587.38	$ 2,230.	$ 2,578.58	$ 2,617.98	$ 2,550.62
Annual savings in carbon tax for electricity [$/year]	$ 7.93	$ 9.22	$ 7.93	$ 9.1	$ 7.88	$ 9.18	$ 7.91	$ 9.14	$ 9.28	$ 9.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,244.86	$ 2,609.54	$ 2,245.01	$ 2,574.96	$ 2,230.66	$ 2,596.55	$ 2,237.91	$ 2,587.72	$ 2,627.26	$ 2,559.66
Annual savings in GHG from electricity savings [kg CO2e/year]	174.5	202.9	174.5	200.2	173.4	201.9	174	201.2	204.2	199
Annual savings in natural gas [m3/year]	194.97	209.64	195.97	209.64	194.97	209.64	194.97	209.64	209.64	209.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,806.42	$ 1,942.32	$ 1,815.7	$ 1,942.32	$ 1,806.42	$ 1,942.32	$ 1,806.42	$ 1,942.32	$ 1,942.32	$ 1,942.32
Annual savings in carbon tax for natural gas [$/year]	$ 450.87	$ 484.79	$ 453.19	$ 484.79	$ 450.87	$ 484.79	$ 450.87	$ 484.79	$ 484.79	$ 484.79
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,257.29	$ 2,427.12	$ 2,268.89	$ 2,427.12	$ 2,257.29	$ 2,427.12	$ 2,257.29	$ 2,427.12	$ 2,427.12	$ 2,427.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	10019.4	10773.2	10070.9	10773.2	10019.4	10773.2	10019.4	10773.2	10773.2	10773.2
Net Present Value [$]	$ 18,101.11	$ 23,005.88	$ 18,178.85	$ 22,596.09	$ 18,077.79	$ 23,004.48	$ 18,254.15	$ 22,938.34	$ 23,723.8	$ 22,538.44
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	8.78	8.78	8.78	8.78	8.78	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 305.47	$ 526.08	$ 526.08
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	7.04	5.28	7.04	5.28	7.04	5.28	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 8,433.05	$ 10,216.25	$ 8,433.05	$ 10,216.25	$ 8,433.05	$ 10,216.25	$ 8,433.05	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.53	$ 331.53	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$.	$ 550.	$.	$ 550.	$ 550.	$.	$.

MEDIUM 50SAR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,779.03	$ 22,558.42	$ 22,323.56	$ 22,102.95	$ 23,279.03	$ 24,240.09	$ 22,823.56	$ 23,058.42	$ 23,784.62	$ 22,602.95
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,214.1	$ 33,882.75	$ 33,529.99	$ 33,198.63	$ 34,965.1	$ 36,408.62	$ 34,280.99	$ 34,633.75	$ 35,724.5	$ 33,949.63
Net Present Value [$]	$ 16,568.41	$ 16,607.8	$ 16,629.1	$ 16,664.84	$ 16,686.62	$ 16,689.66	$ 16,736.	$ 16,744.27	$ 16,745.97	$ 16,782.33
Incremental dollars per GHG saving	$ 2.33	$ 2.31	$ 2.28	$ 2.26	$ 2.38	$ 2.48	$ 2.33	$ 2.36	$ 2.43	$ 2.31
Auxiliary Energy Required Heating [GJ/yr]	93.1	93.9	94.4	95.2	91.8	89.9	93.1	92.5	91.3	93.9
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
Annual Energy Space Heating [GJ/yr]	52.5	52.9	53.2	53.6	52	50.6	52.7	52.4	51.4	53.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	98.1	98.4	98.8	99.2	97.5	96.2	98.2	97.9	96.9	98.6
Design Heating Load [W]	13975.6	14089.9	14123.4	14237.7	13927.5	13414.3	14075.3	14041.8	13562.1	14189.6
Annual Energy Electricity [kWh/yr]	22751.4	22852.4	22951.9	23051.5	22603.1	22231	22799.2	22711.2	22429.8	22902.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,156.01	$ 3,170.3	$ 3,184.38	$ 3,198.47	$ 3,135.02	$ 3,082.37	$ 3,162.77	$ 3,150.32	$ 3,110.5	$ 3,177.45
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	45607	45391	43663	43447	45625	51565	43681	45409	50989	43465
Upgrade Package List	Pkg3331202033	Pkg3331201033	Pkg3321202033	Pkg3321201033	Pkg3331202034	Pkg4331302033	Pkg3321202034	Pkg3331201034	Pkg4321302033	Pkg3321201034
GHGI [kg/m2]	4.61	4.62	4.62	4.63	4.61	4.59	4.62	4.61	4.6	4.62
% ICC	4.4%	4.3%	4.3%	4.2%	4.5%	4.6%	4.4%	4.4%	4.5%	4.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	110.3	111.2	111.9	112.8	108.7	106.5	110.3	109.7	108.1	111.3
Output: MEUI [kWh/(m2 * yr)]	85.4	85.9	86.3	86.7	84.8	83.2	85.6	85.3	84.1	86.1
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2770.0%	2710.0%	2670.0%	2610.0%	2870.0%	3020.0%	2770.0%	2820.0%	2910.0%	2710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14482	14583	14682	14782	14334	13962	14530	14442	14160	14633
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,041.95	$ 2,056.19	$ 2,070.22	$ 2,084.26	$ 2,021.04	$ 1,968.57	$ 2,048.69	$ 2,036.28	$ 1,996.6	$ 2,063.31
Annual savings in carbon tax for electricity [$/year]	$ 7.24	$ 7.29	$ 7.34	$ 7.39	$ 7.17	$ 6.98	$ 7.26	$ 7.22	$ 7.08	$ 7.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,049.19	$ 2,063.48	$ 2,077.56	$ 2,091.65	$ 2,028.2	$ 1,975.55	$ 2,055.95	$ 2,043.5	$ 2,003.68	$ 2,070.63
Annual savings in GHG from electricity savings [kg CO2e/year]	159.3	160.4	161.5	162.6	157.7	153.6	159.8	158.9	155.8	161
Annual savings in natural gas [m3/year]	193.47	193.47	193.47	193.47	193.47	193.47	193.47	193.47	193.47	193.47
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47	$ 1,792.47
Annual savings in carbon tax for natural gas [$/year]	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39	$ 447.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86	$ 2,239.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	9942.1	9942.1	9942.1	9942.1	9942.1	9942.1	9942.1	9942.1	9942.1	9942.1
Net Present Value [$]	$ 16,568.41	$ 16,607.8	$ 16,629.1	$ 16,664.84	$ 16,686.62	$ 16,689.66	$ 16,736.	$ 16,744.27	$ 16,745.97	$ 16,782.33
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	10.51	8.78	10.51	10.51	10.51	8.78	10.51	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.08	$ 305.47	$ 526.08	$ 305.47	$ 526.08	$ 526.08	$ 526.08	$ 305.47	$ 526.08	$ 305.47
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25	$ 10,216.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 787.	$ 787.	$ 331.53	$ 331.53	$ 787.	$ 787.	$ 331.53	$ 787.	$ 331.53	$ 331.53
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3	$ 1,457.3	$ 1,918.36	$ 1,457.3
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MEDIUM 50SAR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,182.58	$ 16,417.17	$ 16,511.84	$ 16,561.84	$ 16,637.91	$ 16,732.58	$ 16,782.58	$ 16,811.84	$ 16,967.17	$ 17,017.17
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,306.24	$ 24,658.59	$ 24,800.78	$ 24,875.88	$ 24,990.14	$ 25,132.34	$ 25,207.44	$ 25,251.38	$ 25,484.69	$ 25,559.79
Net Present Value [$]	$ 26,910.96	$ 26,817.95	$ 27,211.82	$ 24,905.37	$ 26,734.02	$ 27,050.4	$ 24,733.	$ 27,238.6	$ 26,957.64	$ 24,651.35
Incremental dollars per GHG saving	$ 1.52	$ 1.54	$ 1.54	$ 1.48	$ 1.57	$ 1.56	$ 1.5	$ 1.56	$ 1.58	$ 1.52
Auxiliary Energy Required Heating [GJ/yr]	130.1	129.4	130.9	131.3	128.6	130.1	130.5	130.9	129.4	129.8
Annual Energy DHW [GJ/yr]	27.5	27.5	25.7	16.5	27.5	25.7	16.5	24.4	25.6	16.5
Annual Energy Space Heating [GJ/yr]	84.2	83.7	84.7	84.3	83.3	84.2	83.7	84.7	83.7	83.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	139.3	138.9	138	128.5	138.4	137.5	127.9	136.8	137	127.5
Design Heating Load [W]	18128.2	18097.9	18248.1	17760.2	17978	18128.2	17640.4	18248.1	18097.9	17610.1
Annual Energy Electricity [kWh/yr]	31071.9	30947	31220.6	31106.7	30828.3	31071.9	30954	31220.6	30947	30831.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,333.36	$ 4,315.69	$ 4,354.4	$ 4,338.28	$ 4,298.89	$ 4,333.36	$ 4,316.68	$ 4,354.4	$ 4,315.69	$ 4,299.3
Annual Energy Natural Gas [m3/yr]	738	737.3	688.9	442.6	737.4	689	442.6	656.3	688.3	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.35	$ 318.05	$ 297.17	$ 190.92	$ 318.09	$ 297.21	$ 190.92	$ 283.1	$ 296.91	$ 190.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	18100	20962	17831	17833	21232	18101	18103	17832	20963	20965
Upgrade Package List	Pkg2221102031	Pkg2231101031	Pkg2221101031	Pkg2221101031	Pkg2231102031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2231101031
GHGI [kg/m2]	7.49	7.47	7.09	5.08	7.47	7.09	5.07	6.83	7.07	5.06
% ICC	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	154.2	153.3	155.2	155.6	152.3	154.2	154.6	155.2	153.3	153.8
Output: MEUI [kWh/(m2 * yr)]	134.5	133.9	133	121.6	133.4	132.3	121	131.5	131.8	120.4
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1190.0%	1230.0%	1130.0%	1100.0%	1290.0%	1190.0%	1160.0%	1130.0%	1230.0%	1210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	22650	22525	22799	22685	22407	22650	22532	22799	22525	22410
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,193.69	$ 3,176.08	$ 3,214.66	$ 3,198.6	$ 3,159.34	$ 3,193.69	$ 3,177.07	$ 3,214.66	$ 3,176.08	$ 3,159.75
Annual savings in carbon tax for electricity [$/year]	$ 11.33	$ 11.26	$ 11.4	$ 11.34	$ 11.2	$ 11.33	$ 11.27	$ 11.4	$ 11.26	$ 11.2
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,205.02	$ 3,187.34	$ 3,226.06	$ 3,209.94	$ 3,170.55	$ 3,205.02	$ 3,188.33	$ 3,226.06	$ 3,187.34	$ 3,170.96
Annual savings in GHG from electricity savings [kg CO2e/year]	249.2	247.8	250.8	249.5	246.5	249.2	247.9	250.8	247.8	246.5
Annual savings in natural gas [m3/year]	211.66	211.69	213.49	222.67	211.68	213.49	222.67	214.7	213.51	222.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,961.03	$ 1,961.28	$ 1,977.98	$ 2,063.01	$ 1,961.24	$ 1,977.95	$ 2,063.01	$ 1,989.24	$ 1,978.19	$ 2,063.01
Annual savings in carbon tax for natural gas [$/year]	$ 489.46	$ 489.53	$ 493.7	$ 514.92	$ 489.52	$ 493.69	$ 514.92	$ 496.5	$ 493.75	$ 514.92
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,450.5	$ 2,450.8	$ 2,471.68	$ 2,577.92	$ 2,450.76	$ 2,471.64	$ 2,577.92	$ 2,485.74	$ 2,471.94	$ 2,577.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	10877	10878.3	10971	11442.6	10878.1	10970.8	11442.6	11033.4	10972.2	11442.6
Net Present Value [$]	$ 26,910.96	$ 26,817.95	$ 27,211.82	$ 24,905.37	$ 26,734.02	$ 27,050.4	$ 24,733.	$ 27,238.6	$ 26,957.64	$ 24,651.35
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	8.78	10.51	10.51	10.51	8.78	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 305.64	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.

MEDIUM 50SAR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 16,561.84	$ 16,782.58	$ 17,111.84	$ 17,017.17	$ 16,182.58	$ 17,332.58	$ 17,411.84	$ 17,237.91	$ 16,511.84	$ 16,417.17
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,875.88	$ 25,207.44	$ 25,701.98	$ 25,559.79	$ 24,306.24	$ 26,033.54	$ 26,152.58	$ 25,891.34	$ 24,800.78	$ 24,658.59
Net Present Value [$]	$ 24,905.37	$ 24,733.	$ 25,109.43	$ 24,651.35	$ 26,910.96	$ 24,937.25	$ 25,179.78	$ 24,561.15	$ 27,211.82	$ 26,817.95
Incremental dollars per GHG saving	$ 1.48	$ 1.5	$ 1.52	$ 1.52	$ 1.52	$ 1.54	$ 1.54	$ 1.54	$ 1.54	$ 1.54
Auxiliary Energy Required Heating [GJ/yr]	131.3	130.5	131.3	129.8	130.1	130.5	131.3	128.9	130.9	129.4
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	16.5	27.5	14.9	13.9	16.5	25.7	27.5
Annual Energy Space Heating [GJ/yr]	84.3	83.7	84.3	83.3	84.2	83.7	84.3	82.9	84.7	83.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Energy [GJ/yr]	128.5	127.9	126.9	127.5	139.3	126.4	125.9	127	138	138.9
Design Heating Load [W]	17760.2	17640.4	17760.2	17610.1	18128.2	17640.4	17760.2	17490.2	18248.1	18097.9
Annual Energy Electricity [kWh/yr]	31106.7	30954	31108.6	30831.2	31071.9	30956	31109.9	30710.4	31220.6	30947
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,338.28	$ 4,316.68	$ 4,338.55	$ 4,299.3	$ 4,333.36	$ 4,316.96	$ 4,338.74	$ 4,282.21	$ 4,354.4	$ 4,315.69
Annual Energy Natural Gas [m3/yr]	442.6	442.6	400.7	442.6	738	400.7	372.9	442.6	688.9	737.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 318.35	$ 172.85	$ 160.86	$ 190.92	$ 297.17	$ 318.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	18103	17834	20965	18100	18104	17835	21235	17831	20962
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2221101031	Pkg2231101031
GHGI [kg/m2]	5.08	5.07	4.73	5.06	7.49	4.73	4.51	5.06	7.09	7.47
% ICC	3.2%	3.2%	3.3%	3.3%	3.1%	3.3%	3.3%	3.3%	3.2%	3.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	155.6	154.6	155.6	153.8	154.2	154.6	155.7	152.8	155.2	153.3
Output: MEUI [kWh/(m2 * yr)]	121.6	121	119.8	120.4	134.5	119.1	118.6	119.9	133	133.9
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	1100.0%	1160.0%	1100.0%	1210.0%	1190.0%	1160.0%	1100.0%	1270.0%	1130.0%	1230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	22685	22532	22687	22410	22650	22534	22688	22289	22799	22525
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,198.6	$ 3,177.07	$ 3,198.87	$ 3,159.75	$ 3,193.69	$ 3,177.35	$ 3,199.05	$ 3,142.72	$ 3,214.66	$ 3,176.08
Annual savings in carbon tax for electricity [$/year]	$ 11.34	$ 11.27	$ 11.34	$ 11.2	$ 11.33	$ 11.27	$ 11.34	$ 11.14	$ 11.4	$ 11.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,209.94	$ 3,188.33	$ 3,210.21	$ 3,170.96	$ 3,205.02	$ 3,188.62	$ 3,210.39	$ 3,153.87	$ 3,226.06	$ 3,187.34
Annual savings in GHG from electricity savings [kg CO2e/year]	249.5	247.9	249.6	246.5	249.2	247.9	249.6	245.2	250.8	247.8
Annual savings in natural gas [m3/year]	222.67	222.67	224.23	222.67	211.66	224.23	225.26	222.67	213.49	211.69
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,063.01	$ 2,063.01	$ 2,077.47	$ 2,063.01	$ 1,961.03	$ 2,077.47	$ 2,087.07	$ 2,063.01	$ 1,977.98	$ 1,961.28
Annual savings in carbon tax for natural gas [$/year]	$ 514.92	$ 514.92	$ 518.53	$ 514.92	$ 489.46	$ 518.53	$ 520.92	$ 514.92	$ 493.7	$ 489.53
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,577.92	$ 2,577.92	$ 2,596.	$ 2,577.92	$ 2,450.5	$ 2,596.	$ 2,607.99	$ 2,577.92	$ 2,471.68	$ 2,450.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	11442.6	11442.6	11522.8	11442.6	10877	11522.8	11576.1	11442.6	10971	10878.3
Net Present Value [$]	$ 24,905.37	$ 24,733.	$ 25,109.43	$ 24,651.35	$ 26,910.96	$ 24,937.25	$ 25,179.78	$ 24,561.15	$ 27,211.82	$ 26,817.95
ECM Details Envelope Components										
Attic Ceiling RSI	8.78	10.51	8.78	8.78	10.51	10.51	8.78	10.51	8.78	8.78
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 305.64	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 305.64	$ 526.38	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37	$ 8,432.37
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.

MEDIUM 50SAR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,895.8	$ 34,192.08	$ 34,332.42	$ 34,469.17	$ 34,628.7	$ 34,669.17	$ 34,969.17	$ 34,765.45	$ 34,965.45	$ 35,265.45
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,911.49	$ 51,356.5	$ 51,567.29	$ 51,772.69	$ 52,012.31	$ 52,073.09	$ 52,523.69	$ 52,217.71	$ 52,518.11	$ 52,968.71
Net Present Value [$]	$ 2,888.62	$ 3,184.9	$ 3,340.04	$ 3,505.37	$ 3,636.32	$ 3,638.71	$ 3,706.49	$ 3,801.65	$ 3,934.99	$ 4,002.77
Incremental dollars per GHG saving	$ 4.93	$ 4.97	$ 5.	$ 5.02	$ 5.04	$ 5.04	$ 5.04	$ 5.06	$ 5.08	$ 5.09
Auxiliary Energy Required Heating [GJ/yr]	87.9	87.9	88	88.1	88	86.9	86.9	88.1	86.9	86.9
Annual Energy DHW [GJ/yr]	13.9	13.9	13.9	13.9	13.9	14.9	13.9	13.9	14.9	13.9
Annual Energy Space Heating [GJ/yr]	93.1	93.1	93.2	93.3	93.2	92	92.1	93.3	92	92.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	134.4	134.4	134.4	134.5	134.4	134.3	133.3	134.5	134.3	133.3
Design Heating Load [W]	12225.3	12225.3	12191.7	12171.6	12191.7	12121.1	12121.1	12171.6	12121.1	12121.1
Annual Energy Electricity [kWh/yr]	8056.5	8056.5	8056.8	8057.4	8056.8	8051	8051	8057.4	8051	8051
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,076.68	$ 1,076.68	$ 1,076.72	$ 1,076.81	$ 1,076.72	$ 1,075.9	$ 1,075.9	$ 1,076.81	$ 1,075.9	$ 1,075.9
Annual Energy Natural Gas [m3/yr]	2829.2	2829.2	2830.9	2834.1	2830.9	2828.1	2800.4	2834.1	2828.1	2800.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,220.42	$ 1,220.42	$ 1,221.15	$ 1,222.53	$ 1,221.15	$ 1,219.94	$ 1,207.99	$ 1,222.53	$ 1,219.94	$ 1,207.99
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	51792	52080	52224	52350	52512	52367	52368	52638	52655	52656
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4341302054	Pkg4341303053	Pkg4341402054	Pkg4341303054	Pkg4341303054	Pkg4341403053	Pkg4341403054	Pkg4341403054
GHGI [kg/m2]	23.49	23.49	23.5	23.53	23.5	23.48	23.25	23.53	23.48	23.25
% ICC	6.5%	6.5%	6.6%	6.6%	6.6%	6.6%	6.7%	6.7%	6.7%	6.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	104.2	104.2	104.3	104.4	104.3	103	103	104.4	103	103
Output: MEUI [kWh/(m2 * yr)]	128.9	128.9	128.9	129.1	128.9	128.8	127.6	129.1	128.8	127.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	4040.0%	4040.0%	4040.0%	4030.0%	4040.0%	4110.0%	4110.0%	4030.0%	4110.0%	4110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	365	365	365	364	365	371	371	364	371	371
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 51.48	$ 51.48	$ 51.44	$ 51.35	$ 51.44	$ 52.25	$ 52.25	$ 51.35	$ 52.25	$ 52.25
Annual savings in carbon tax for electricity [$/year]	$ .18	$ .18	$ .18	$ .18	$ .18	$ .19	$ .19	$ .18	$ .19	$ .19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 51.66	$ 51.66	$ 51.62	$ 51.53	$ 51.62	$ 52.44	$ 52.44	$ 51.53	$ 52.44	$ 52.44
Annual savings in GHG from electricity savings [kg CO2e/year]	4	4	4	4	4	4.1	4.1	4	4.1	4.1
Annual savings in natural gas [m3/year]	133.74	133.74	133.68	133.56	133.68	133.79	134.82	133.56	133.79	134.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,239.14	$ 1,239.14	$ 1,238.56	$ 1,237.45	$ 1,238.56	$ 1,239.52	$ 1,249.09	$ 1,237.45	$ 1,239.52	$ 1,249.09
Annual savings in carbon tax for natural gas [$/year]	$ 309.28	$ 309.28	$ 309.14	$ 308.86	$ 309.14	$ 309.38	$ 311.77	$ 308.86	$ 309.38	$ 311.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,548.43	$ 1,548.43	$ 1,547.7	$ 1,546.31	$ 1,547.7	$ 1,548.9	$ 1,560.85	$ 1,546.31	$ 1,548.9	$ 1,560.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	6873	6873	6869.7	6863.6	6869.7	6875.1	6928.1	6863.6	6875.1	6928.1
Net Present Value [$]	$ 2,888.62	$ 3,184.9	$ 3,340.04	$ 3,505.37	$ 3,636.32	$ 3,638.71	$ 3,706.49	$ 3,801.65	$ 3,934.99	$ 4,002.77
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.51	14.09	10.51	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,163.13	$ 1,163.13	$ 526.38	$ 1,163.13	$ 526.38	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13	$ 1,163.13
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9	$ 13,312.9
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 786.76	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13	$ 1,860.13
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 2,213.87	$ 2,213.87
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.

MEDIUM 50SAR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,096.34	$ 23,330.93	$ 23,375.6	$ 23,406.93	$ 23,551.67	$ 23,557.22	$ 23,596.34	$ 23,627.67	$ 23,646.34	$ 23,672.34
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,690.7	$ 35,043.06	$ 35,110.15	$ 35,157.21	$ 35,374.61	$ 35,382.94	$ 35,441.7	$ 35,488.76	$ 35,516.8	$ 35,555.85
Net Present Value [$]	$ 29,265.52	$ 29,195.01	$ 29,534.19	$ 22,804.07	$ 29,067.2	$ 29,726.4	$ 29,405.83	$ 22,707.85	$ 29,098.88	$ 23,036.44
Incremental dollars per GHG saving	$ 1.92	$ 1.94	$ 1.94	$ 2.06	$ 1.96	$ 1.96	$ 1.96	$ 2.08	$ 1.96	$ 2.08
Auxiliary Energy Required Heating [GJ/yr]	118	117.4	117.6	110.8	116.5	118	116.7	109.9	117.6	110.2
Annual Energy DHW [GJ/yr]	9.5	9.5	9.5	13.9	9.5	9.5	9.5	13.9	8.7	13.9
Annual Energy Space Heating [GJ/yr]	76	75.6	76	71.7	75.1	76	75.5	71.3	75.8	71.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	114.1	113.7	114.1	114.2	113.2	114.1	113.6	113.7	113.1	114.1
Design Heating Load [W]	15265.1	15234.8	15334.6	14765.9	15114.9	15265.1	15214.7	14646	15265.1	14745.7
Annual Energy Electricity [kWh/yr]	31702.1	31583.6	31698	27858.4	31448.2	31702.1	31562.4	27735.3	31423.7	27845.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,422.53	$ 4,405.76	$ 4,421.95	$ 3,878.65	$ 4,386.61	$ 4,422.53	$ 4,402.76	$ 3,861.23	$ 4,383.14	$ 3,876.84
Annual Energy Natural Gas [m3/yr]	0	0	0	372.9	0	0	0	372.9	0	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 160.86	$.	$.	$.	$ 160.86	$.	$ 160.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43666	45394	43468	45393	45610	44314	43684	45609	43667	43683
Upgrade Package List	Pkg3321202033	Pkg3331201033	Pkg3321201034	Pkg3331201033	Pkg3331202033	Pkg3321302033	Pkg3321202034	Pkg3331202033	Pkg3321202033	Pkg3321202034
GHGI [kg/m2]	1.49	1.48	1.49	4.35	1.48	1.49	1.48	4.35	1.47	4.35
% ICC	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	139.9	139.1	139.3	131.3	138.1	139.9	138.3	130.3	139.4	130.6
Output: MEUI [kWh/(m2 * yr)]	104.6	104.1	104.6	104.7	103.6	104.6	104	104.2	103.4	104.6
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2010.0%	2050.0%	2030.0%	2490.0%	2110.0%	2010.0%	2090.0%	2550.0%	2030.0%	2530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	23280	23162	23276	19437	23027	23280	23141	19314	23002	19424
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,282.55	$ 3,265.84	$ 3,281.97	$ 2,740.59	$ 3,246.75	$ 3,282.55	$ 3,262.85	$ 2,723.23	$ 3,243.3	$ 2,738.78
Annual savings in carbon tax for electricity [$/year]	$ 11.64	$ 11.58	$ 11.64	$ 9.72	$ 11.51	$ 11.64	$ 11.57	$ 9.66	$ 11.5	$ 9.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,294.19	$ 3,277.42	$ 3,293.61	$ 2,750.31	$ 3,258.26	$ 3,294.19	$ 3,274.42	$ 2,732.89	$ 3,254.8	$ 2,748.5
Annual savings in GHG from electricity savings [kg CO2e/year]	256.1	254.8	256	213.8	253.3	256.1	254.5	212.5	253	213.7
Annual savings in natural gas [m3/year]	239.16	239.16	239.16	225.26	239.16	239.16	239.16	225.26	239.16	225.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,087.07	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,087.07	$ 2,215.79	$ 2,087.07
Annual savings in carbon tax for natural gas [$/year]	$ 553.05	$ 553.05	$ 553.05	$ 520.92	$ 553.05	$ 553.05	$ 553.05	$ 520.92	$ 553.05	$ 520.92
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,607.99	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,607.99	$ 2,768.85	$ 2,607.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	12290	12290	12290	11576.1	12290	12290	12290	11576.1	12290	11576.1
Net Present Value [$]	$ 29,265.52	$ 29,195.01	$ 29,534.19	$ 22,804.07	$ 29,067.2	$ 29,726.4	$ 29,405.83	$ 22,707.85	$ 29,098.88	$ 23,036.44
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	8.78	10.51	10.51	10.51	10.51	10.51	10.51
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 331.43	$ 331.43	$ 786.76	$ 331.43	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$.	$.	$.	$ 850.	$ 550.	$ 850.

MEDIUM 50SAR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 23,096.34	$ 23,330.93	$ 23,375.6	$ 23,551.67	$ 23,557.22	$ 23,596.34	$ 23,646.34	$ 23,733.09	$ 23,791.81	$ 23,830.93
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,690.7	$ 35,043.06	$ 35,110.15	$ 35,374.61	$ 35,382.94	$ 35,441.7	$ 35,516.8	$ 35,647.1	$ 35,735.3	$ 35,794.06
Net Present Value [$]	$ 29,265.52	$ 29,195.01	$ 29,534.19	$ 29,067.2	$ 29,726.4	$ 29,405.83	$ 29,098.88	$ 29,458.95	$ 29,655.89	$ 29,339.7
Incremental dollars per GHG saving	$ 1.92	$ 1.94	$ 1.94	$ 1.96	$ 1.96	$ 1.96	$ 1.96	$ 1.97	$ 1.98	$ 1.98
Auxiliary Energy Required Heating [GJ/yr]	118	117.4	117.6	116.5	118	116.7	117.6	116.9	117.4	116.1
Annual Energy DHW [GJ/yr]	9.5	9.5	9.5	9.5	9.5	9.5	8.7	9.5	9.5	9.5
Annual Energy Space Heating [GJ/yr]	76	75.6	76	75.1	76	75.5	75.8	75.4	75.6	75.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	114.1	113.7	114.1	113.2	114.1	113.6	113.1	113.5	113.7	113.2
Design Heating Load [W]	15265.1	15234.8	15334.6	15114.9	15265.1	15214.7	15265.1	15194.6	15234.8	15184.4
Annual Energy Electricity [kWh/yr]	31702.1	31583.6	31698	31448.2	31702.1	31562.4	31423.7	31529.9	31583.6	31445.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,422.53	$ 4,405.76	$ 4,421.95	$ 4,386.61	$ 4,422.53	$ 4,402.76	$ 4,383.14	$ 4,398.17	$ 4,405.76	$ 4,386.24
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43666	45394	43468	45610	44314	43684	43667	43882	46042	45412
Upgrade Package List	Pkg3321202033	Pkg3331201033	Pkg3321201034	Pkg3331202033	Pkg3321302033	Pkg3321202034	Pkg3321202033	Pkg3321203033	Pkg3331301033	Pkg3331201034
GHGI [kg/m2]	1.49	1.48	1.49	1.48	1.49	1.48	1.47	1.48	1.48	1.48
% ICC	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.6%	4.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	139.9	139.1	139.3	138.1	139.9	138.3	139.4	138.5	139.1	137.6
Output: MEUI [kWh/(m2 * yr)]	104.6	104.1	104.6	103.6	104.6	104	103.4	103.9	104.1	103.5
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2010.0%	2050.0%	2030.0%	2110.0%	2010.0%	2090.0%	2030.0%	2080.0%	2050.0%	2130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	23280	23162	23276	23027	23280	23141	23002	23108	23162	23024
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,282.55	$ 3,265.84	$ 3,281.97	$ 3,246.75	$ 3,282.55	$ 3,262.85	$ 3,243.3	$ 3,258.27	$ 3,265.84	$ 3,246.38
Annual savings in carbon tax for electricity [$/year]	$ 11.64	$ 11.58	$ 11.64	$ 11.51	$ 11.64	$ 11.57	$ 11.5	$ 11.55	$ 11.58	$ 11.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,294.19	$ 3,277.42	$ 3,293.61	$ 3,258.26	$ 3,294.19	$ 3,274.42	$ 3,254.8	$ 3,269.82	$ 3,277.42	$ 3,257.9
Annual savings in GHG from electricity savings [kg CO2e/year]	256.1	254.8	256	253.3	256.1	254.5	253	254.2	254.8	253.3
Annual savings in natural gas [m3/year]	239.16	239.16	239.16	239.16	239.16	239.16	239.16	239.16	239.16	239.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79	$ 2,215.79
Annual savings in carbon tax for natural gas [$/year]	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05	$ 553.05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85	$ 2,768.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	12290	12290	12290	12290	12290	12290	12290	12290	12290	12290
Net Present Value [$]	$ 29,265.52	$ 29,195.01	$ 29,534.19	$ 29,067.2	$ 29,726.4	$ 29,405.83	$ 29,098.88	$ 29,458.95	$ 29,655.89	$ 29,339.7
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	8.78	8.78	10.51	10.51	10.51	10.51	14.09	8.78	8.78
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 526.38	$ 305.64	$ 305.64	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 305.64	$ 305.64
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 331.43	$ 786.76	$ 331.43	$ 786.76	$ 331.43	$ 331.43	$ 331.43	$ 331.43	$ 786.76	$ 786.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71	$ 1,456.71	$ 1,456.71	$ 1,917.59	$ 1,456.71
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.

MEDIUM 50SAR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k	medium 50SAR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,238.55	$ 24,738.55	$ 24,788.55	$ 24,875.3	$ 25,088.55	$ 24,534.83	$ 24,283.22	$ 25,288.55	$ 25,375.3	$ 24,333.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,406.3	$ 37,157.3	$ 37,232.4	$ 37,362.7	$ 37,683.	$ 36,851.31	$ 36,473.4	$ 37,983.4	$ 38,113.7	$ 36,548.5
Net Present Value [$]	$ 21,991.23	$ 22,132.64	$ 22,195.66	$ 22,197.63	$ 22,266.01	$ 22,287.51	$ 22,332.24	$ 22,336.88	$ 22,337.75	$ 22,393.44
Incremental dollars per GHG saving	$ 2.16	$ 2.2	$ 2.19	$ 2.21	$ 2.21	$ 2.18	$ 2.16	$ 2.23	$ 2.26	$ 2.15
Auxiliary Energy Required Heating [GJ/yr]	106	104.8	106	104.9	106.1	106	106.3	104.8	103.7	107.6
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	16.5	13.9	16.5	16.5	14.9	16.5	14.9
Annual Energy Space Heating [GJ/yr]	68.6	68.1	68.6	68	68.6	68.6	69	68.1	67.5	69.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy [GJ/yr]	113.7	113.2	112.1	113.1	111.1	113.7	114.1	111.6	112.5	113
Design Heating Load [W]	14034.5	13984	14034.5	13963.9	14034.5	14034.5	14134.2	13984	13913.4	14184.6
Annual Energy Electricity [kWh/yr]	26992.9	26853.6	26994.9	26825.7	26996.2	26992.9	27108	26855.6	26685.9	27248.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,756.18	$ 3,736.47	$ 3,756.46	$ 3,732.52	$ 3,756.65	$ 3,756.18	$ 3,772.47	$ 3,736.75	$ 3,712.74	$ 3,792.36
Annual Energy Natural Gas [m3/yr]	442.6	442.6	400.7	442.6	372.9	442.6	442.6	400.7	442.6	400.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 172.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51565	51583	51566	51709	51567	51853	51007	51584	51727	50990
Upgrade Package List	Pkg4331302033	Pkg4331302034	Pkg4331302033	Pkg4331303033	Pkg4331302033	Pkg4331402033	Pkg4321302034	Pkg4331302034	Pkg4331303034	Pkg4321302033
GHGI [kg/m2]	4.88	4.88	4.54	4.87	4.31	4.88	4.89	4.53	4.87	4.55
% ICC	4.6%	4.7%	4.7%	4.8%	4.8%	4.7%	4.6%	4.8%	4.9%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	125.7	124.2	125.7	124.3	125.7	125.7	126	124.2	122.9	127.5
Output: MEUI [kWh/(m2 * yr)]	104.1	103.5	102.2	103.4	101	104.1	104.6	101.6	102.8	103.3
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Output: Better than Envelope (%)	2820.0%	2900.0%	2820.0%	2890.0%	2810.0%	2820.0%	2800.0%	2900.0%	2970.0%	2710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18571	18432	18573	18404	18575	18571	18686	18434	18264	18827
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,618.55	$ 2,598.91	$ 2,618.84	$ 2,594.98	$ 2,619.02	$ 2,618.55	$ 2,634.78	$ 2,599.19	$ 2,575.27	$ 2,654.61
Annual savings in carbon tax for electricity [$/year]	$ 9.29	$ 9.22	$ 9.29	$ 9.2	$ 9.29	$ 9.29	$ 9.34	$ 9.22	$ 9.13	$ 9.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,627.84	$ 2,608.13	$ 2,628.12	$ 2,604.18	$ 2,628.31	$ 2,627.84	$ 2,644.13	$ 2,608.41	$ 2,584.4	$ 2,664.02
Annual savings in GHG from electricity savings [kg CO2e/year]	204.3	202.8	204.3	202.4	204.3	204.3	205.6	202.8	200.9	207.1
Annual savings in natural gas [m3/year]	222.67	222.67	224.23	222.67	225.26	222.67	222.67	224.23	222.67	224.23
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,063.01	$ 2,063.01	$ 2,077.47	$ 2,063.01	$ 2,087.07	$ 2,063.01	$ 2,063.01	$ 2,077.47	$ 2,063.01	$ 2,077.47
Annual savings in carbon tax for natural gas [$/year]	$ 514.92	$ 514.92	$ 518.53	$ 514.92	$ 520.92	$ 514.92	$ 514.92	$ 518.53	$ 514.92	$ 518.53
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,577.92	$ 2,577.92	$ 2,596.	$ 2,577.92	$ 2,607.99	$ 2,577.92	$ 2,577.92	$ 2,596.	$ 2,577.92	$ 2,596.
Annual savings in GHG from natural gas savings [kg CO2e/year]	11442.6	11442.6	11522.8	11442.6	11576.1	11442.6	11442.6	11522.8	11442.6	11522.8
Net Present Value [$]	$ 21,991.23	$ 22,132.64	$ 22,195.66	$ 22,197.63	$ 22,266.01	$ 22,287.51	$ 22,332.24	$ 22,336.88	$ 22,337.75	$ 22,393.44
ECM Details Envelope Components										
Attic Ceiling RSI	10.51	10.51	10.51	14.09	10.51	10.51	10.51	10.51	14.09	10.51
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38	$ 526.38	$ 526.38	$ 526.38	$ 1,163.13	$ 526.38
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4	$ 2,492.4
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42	$ 10,215.42
Foundation Wall Interior Insulation Cost of Upgrade	$ 786.76	$ 786.76	$ 786.76	$ 786.76	$ 786.76	$ 786.76	$ 331.43	$ 786.76	$ 786.76	$ 331.43
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 2,213.87	$ 1,917.59	$ 1,917.59	$ 1,917.59	$ 1,917.59
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.	$ 550.

LARGE Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,002.81	$ 11,464.3	$ 11,502.81	$ 11,552.81	$ 11,602.81	$ 11,682.24	$ 11,761.47	$ 11,811.47	$ 11,824.47	$ 11,852.81
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,002.81	$ 11,464.3	$ 11,502.81	$ 11,552.81	$ 11,602.81	$ 11,682.24	$ 11,761.47	$ 11,811.47	$ 11,824.47	$ 11,852.81
Net Present Value [$]	$ 434.61	$ 139.54	$ 1,094.67	$ 170.93	$ 1,498.86	$ 31.43	$ 457.23	$ 1,428.77	$ 1,508.04	$ 54.37
Incremental dollars per GHG saving	$ 5.12	$ 5.24	$ 4.79	$ 5.21	$ 4.57	$ 5.32	$ 5.54	$ 6.13	$ 6.19	$ 5.25
Auxiliary Energy Required Heating [GJ/yr]	58.9	58.2	54.2	58.9	61.5	58	59.4	64.3	63.4	58.9
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	13.5	23.7	23.7	22.5	23.7	21.6
Annual Energy Space Heating [GJ/yr]	62.4	61.7	57.4	62.4	65.1	61.5	63	68.1	67.2	62.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	112.9	112.1	107.9	111.6	105.4	111.9	113.4	117.3	117.7	110.8
Design Heating Load [W]	11352.5	11239	10543.9	11352.5	11229.7	11256.9	10543.9	11352.5	10660.3	11352.5
Annual Energy Electricity [kWh/yr]	7738.8	7735.3	7714.1	7738.8	7752.5	7734.3	7741.7	7767.5	7762.9	7738.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,031.73	$ 1,031.23	$ 1,028.23	$ 1,031.73	$ 1,033.66	$ 1,031.09	$ 1,032.14	$ 1,035.79	$ 1,035.14	$ 1,031.73
Annual Energy Natural Gas [m3/yr]	2282.5	2263.7	2151.6	2248.3	2079.6	2258.4	2297.5	2399.6	2408.9	2226.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 984.59	$ 976.48	$ 928.13	$ 969.84	$ 897.07	$ 974.2	$ 991.06	$ 1,035.1	$ 1,039.12	$ 960.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1729	1999	11449	1730	1732	3349	11395	1676	17713	1731
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131101031	Pkg2121101021	Pkg1121101021	Pkg2221101011	Pkg1121101031
GHGI [kg/m2]	8.72	8.65	8.23	8.59	7.96	8.63	8.78	9.16	9.19	8.51
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	32	31.6	29.5	32	33.4	31.5	32.3	35	34.5	32
Output: MEUI [kWh/(m2 * yr)]	47.4	47	44.7	46.7	43.3	46.9	47.7	49.8	50	46.3
Output: Better than ERS (%)	980.0%	1050.0%	1380.0%	1090.0%	1220.0%	1060.0%	940.0%	630.0%	600.0%	1150.0%
Output: Better than Envelope (%)	470.0%	580.0%	1230.0%	470.0%	50.0%	610.0%	390.0%	400.0%	260.0%	470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	802	806	827	802	788	807	799	774	778	802
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 113.11	$ 113.6	$ 116.59	$ 113.11	$ 111.18	$ 113.74	$ 112.7	$ 109.06	$ 109.71	$ 113.11
Annual savings in carbon tax for electricity [$/year]	$ .4	$ .4	$ .41	$ .4	$ .39	$ .4	$ .4	$ .39	$ .39	$ .4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 113.51	$ 114.01	$ 117.01	$ 113.51	$ 111.57	$ 114.15	$ 113.1	$ 109.45	$ 110.1	$ 113.51
Annual savings in GHG from electricity savings [kg CO2e/year]	8.8	8.9	9.1	8.8	8.7	8.9	8.8	8.5	8.6	8.8
Annual savings in natural gas [m3/year]	41.69	42.39	46.57	42.96	49.25	42.59	41.13	37.33	36.98	43.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 386.25	$ 392.74	$ 431.44	$ 398.05	$ 456.29	$ 394.57	$ 381.07	$ 345.83	$ 342.61	$ 405.61
Annual savings in carbon tax for natural gas [$/year]	$ 96.41	$ 98.03	$ 107.68	$ 99.35	$ 113.89	$ 98.48	$ 95.11	$ 86.32	$ 85.52	$ 101.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 482.65	$ 490.76	$ 539.12	$ 497.41	$ 570.18	$ 493.05	$ 476.18	$ 432.14	$ 428.13	$ 506.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	2142.4	2178.3	2393	2207.8	2530.8	2188.5	2113.6	1918.1	1900.3	2249.8
Net Present Value [$]	$ 434.61	$ 139.54	$ 1,094.67	$ 170.93	$ 1,498.86	$ 31.43	$ 457.23	$ 1,428.77	$ 1,508.04	$ 54.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,931.48	$.	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 9,440.93	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$.	$ 850.

LARGE Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 15,526.81	$ 15,988.3	$ 16,026.81	$ 16,076.81	$ 16,206.24	$ 16,285.47	$ 16,376.81	$ 13,339.99	$ 14,752.81	$ 16,488.3
ICC with multiplier (Van=1.0,this Cz =1)	$ 15,526.81	$ 15,988.3	$ 16,026.81	$ 16,076.81	$ 16,206.24	$ 16,285.47	$ 16,376.81	$ 13,339.99	$ 14,752.81	$ 16,488.3
Net Present Value [$]	$ 6,818.16	$ 7,063.28	$ 6,106.89	$ 6,909.87	$ 7,262.05	$ 7,377.43	$ 6,915.36	$ 4,800.7	$ 2,615.	$ 6,421.03
Incremental dollars per GHG saving	$ 2.42	$ 2.49	$ 2.49	$ 2.5	$ 2.52	$ 2.53	$ 2.55	$ 2.55	$ 2.56	$ 2.56
Auxiliary Energy Required Heating [GJ/yr]	65	64.3	60.3	64.7	64.2	66	64.6	66.5	61.4	59.6
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.8	7.8	6.9	23.7	13.5	7.8
Annual Energy Space Heating [GJ/yr]	22.8	22.6	21.1	22.7	22.5	22.8	22.6	23.1	21.6	20.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	58.4	58.1	56.7	57.8	58.1	58.1	57.4	74.9	62.9	56.5
Design Heating Load [W]	11399.2	11285.8	10587.7	11399.2	11303.7	10587.7	11399.2	10940	11276.2	10474.3
Annual Energy Electricity [kWh/yr]	16225.1	16141.1	15754.6	16047.1	16133.6	16147.7	15932.7	14218.3	13715	15697.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,232.54	$ 2,220.65	$ 2,165.96	$ 2,207.35	$ 2,219.59	$ 2,221.58	$ 2,191.16	$ 1,948.57	$ 1,877.36	$ 2,157.87
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	637	362.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$ 274.78	$ 156.2	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1744	2014	11464	1745	3364	11410	1746	11368	1741	11734
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1131101031	Pkg2121101021	Pkg1121101031	Pkg2121101012	Pkg1121101031	Pkg2121102031
GHGI [kg/m2]	0.35	0.34	0.35	0.35	0.35	0.35	0.34	2.69	1.65	0.34
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.2%	1.3%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35.3	35	32.8	35.2	34.9	35.9	35.1	36.1	33.4	32.4
Output: MEUI [kWh/(m2 * yr)]	17.8	17.6	16.8	17.4	17.6	17.6	17.2	26.8	20.2	16.7
Output: Better than ERS (%)	5100.0%	5120.0%	5240.0%	5150.0%	5120.0%	5120.0%	5180.0%	3980.0%	4720.0%	5260.0%
Output: Better than Envelope (%)	520.0%	400.0%	240.0%	470.0%	390.0%	680.0%	450.0%	760.0%	60.0%	360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7684	7600	7214	7506	7593	7607	7392	5677	5174	7156
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,083.46	$ 1,071.61	$ 1,017.12	$ 1,058.36	$ 1,070.56	$ 1,072.54	$ 1,042.23	$ 800.5	$ 729.53	$ 1,009.05
Annual savings in carbon tax for electricity [$/year]	$ 3.84	$ 3.8	$ 3.61	$ 3.75	$ 3.8	$ 3.8	$ 3.7	$ 2.84	$ 2.59	$ 3.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,087.3	$ 1,075.41	$ 1,020.72	$ 1,062.11	$ 1,074.35	$ 1,076.35	$ 1,045.93	$ 803.34	$ 732.12	$ 1,012.63
Annual savings in GHG from electricity savings [kg CO2e/year]	84.5	83.6	79.3	82.6	83.5	83.7	81.3	62.5	56.9	78.7
Annual savings in natural gas [m3/year]	126.73	126.73	126.73	126.73	126.73	126.73	126.73	103	113.24	126.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,174.18	$ 1,174.18	$ 1,174.18	$ 1,174.18	$ 1,174.18	$ 1,174.18	$ 1,174.18	$ 954.28	$ 1,049.18	$ 1,174.18
Annual savings in carbon tax for natural gas [$/year]	$ 293.07	$ 293.07	$ 293.07	$ 293.07	$ 293.07	$ 293.07	$ 293.07	$ 238.18	$ 261.87	$ 293.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,467.25	$ 1,467.25	$ 1,467.25	$ 1,467.25	$ 1,467.25	$ 1,467.25	$ 1,467.25	$ 1,192.47	$ 1,311.05	$ 1,467.25
Annual savings in GHG from natural gas savings [kg CO2e/year]	6512.6	6512.6	6512.6	6512.6	6512.6	6512.6	6512.6	5293	5819.3	6512.6
Net Present Value [$]	$ 6,818.16	$ 7,063.28	$ 6,106.89	$ 6,909.87	$ 7,262.05	$ 7,377.43	$ 6,915.36	$ 4,800.7	$ 2,615.	$ 6,421.03
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,672.82	$.	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$.	$.	$.

LARGE Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,102.81	$ 12,564.3	$ 12,652.81	$ 12,952.81	$ 12,782.24	$ 13,114.3	$ 11,602.81	$ 13,414.3	$ 13,243.73	$ 13,332.24
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,102.81	$ 12,564.3	$ 12,652.81	$ 12,952.81	$ 12,782.24	$ 13,114.3	$ 11,602.81	$ 13,414.3	$ 13,243.73	$ 13,332.24
Net Present Value [$]	$ 2,168.87	$ 1,874.72	$ 1,860.61	$ 1,715.66	$ 1,700.34	$ 1,566.88	$ 1,498.86	$ 1,421.32	$ 1,405.27	$ 1,392.14
Incremental dollars per GHG saving	$ 4.33	$ 4.44	$ 4.44	$ 4.49	$ 4.5	$ 4.55	$ 4.57	$ 4.6	$ 4.61	$ 4.61
Auxiliary Energy Required Heating [GJ/yr]	56.8	56.1	56.8	56.8	55.9	56.1	61.5	56.1	55.2	55.9
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	11.7	13.5	12.4	13.5	11.7	13.5	12.4
Annual Energy Space Heating [GJ/yr]	60.1	59.4	60.1	60.1	59.2	59.4	65.1	59.4	58.5	59.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	100.3	99.6	99.3	98.6	99.4	98.6	105.4	97.9	98.7	98.4
Design Heating Load [W]	10421.9	10308.4	10421.9	10421.9	10326.3	10308.4	11229.7	10308.4	10212.8	10326.3
Annual Energy Electricity [kWh/yr]	7727.5	7724	7727.6	7727.6	7723	7724	7752.5	7724.1	7719.5	7723.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,030.13	$ 1,029.63	$ 1,030.14	$ 1,030.14	$ 1,029.49	$ 1,029.63	$ 1,033.66	$ 1,029.65	$ 1,028.99	$ 1,029.5
Annual Energy Natural Gas [m3/yr]	1947.6	1928.7	1918.7	1900.2	1923.8	1899.8	2079.6	1881.3	1905	1894.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 840.13	$ 831.97	$ 827.66	$ 819.68	$ 829.86	$ 819.51	$ 897.07	$ 811.53	$ 821.75	$ 817.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	11454	13072	11723	1732	11724	13342	13073
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg1121101031	Pkg2121102031	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	7.46	7.39	7.36	7.29	7.37	7.28	7.96	7.22	7.3	7.27
% ICC	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.0%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	30.9	30.5	30.9	30.9	30.4	30.5	33.4	30.5	30	30.4
Output: MEUI [kWh/(m2 * yr)]	40.6	40.2	40	39.7	40.1	39.6	43.3	39.3	39.7	39.5
Output: Better than ERS (%)	1640.0%	1700.0%	1730.0%	1780.0%	1720.0%	1780.0%	1220.0%	1840.0%	1770.0%	1800.0%
Output: Better than Envelope (%)	810.0%	920.0%	810.0%	810.0%	950.0%	920.0%	50.0%	920.0%	1070.0%	950.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	814	817	813	813	818	817	788	817	822	818
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 114.7	$ 115.2	$ 114.69	$ 114.69	$ 115.34	$ 115.2	$ 111.18	$ 115.18	$ 115.83	$ 115.32
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .39	$ .41	$ .41	$ .41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 115.11	$ 115.61	$ 115.1	$ 115.1	$ 115.75	$ 115.61	$ 111.57	$ 115.59	$ 116.24	$ 115.73
Annual savings in GHG from electricity savings [kg CO2e/year]	8.9	9	8.9	8.9	9	9	8.7	9	9	9
Annual savings in natural gas [m3/year]	54.17	54.87	55.24	55.93	55.05	55.95	49.25	56.64	55.75	56.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 501.86	$ 508.38	$ 511.83	$ 518.22	$ 510.07	$ 518.36	$ 456.29	$ 524.74	$ 516.56	$ 520.05
Annual savings in carbon tax for natural gas [$/year]	$ 125.26	$ 126.89	$ 127.75	$ 129.35	$ 127.31	$ 129.38	$ 113.89	$ 130.97	$ 128.93	$ 129.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 627.12	$ 635.27	$ 639.59	$ 647.57	$ 637.39	$ 647.74	$ 570.18	$ 655.72	$ 645.49	$ 649.85
Annual savings in GHG from natural gas savings [kg CO2e/year]	2783.6	2819.8	2838.9	2874.3	2829.2	2875.1	2530.8	2910.5	2865.1	2884.5
Net Present Value [$]	$ 2,168.87	$ 1,874.72	$ 1,860.61	$ 1,715.66	$ 1,700.34	$ 1,566.88	$ 1,498.86	$ 1,421.32	$ 1,405.27	$ 1,392.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$.	$ 550.

LARGE Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,808.78	$ 16,026.72	$ 16,188.21	$ 16,297.29	$ 16,318.78	$ 16,407.29	$ 16,457.29	$ 16,488.21	$ 16,536.72	$ 16,707.29
ICC with multiplier (Van=1.0,this Cz =1)	$ 15,808.78	$ 16,026.72	$ 16,188.21	$ 16,297.29	$ 16,318.78	$ 16,407.29	$ 16,457.29	$ 16,488.21	$ 16,536.72	$ 16,707.29
Net Present Value [$]	$ 1,202.64	$ 1,375.32	$ 1,558.14	$ 1,898.86	$ 2,034.91	$ 2,000.85	$ 622.8	$ 1,673.97	$ 2,209.46	$ 2,117.65
Incremental dollars per GHG saving	$ 5.56	$ 5.62	$ 5.69	$ 5.63	$ 5.69	$ 5.66	$ 5.09	$ 5.71	$ 5.74	$ 5.68
Auxiliary Energy Required Heating [GJ/yr]	48	47.8	47.2	45	45.4	46.1	48.5	47.2	45.3	46.1
Annual Energy DHW [GJ/yr]	21.7	21.6	22.5	23.7	23.7	22.5	13.5	21.6	23.7	21.7
Annual Energy Space Heating [GJ/yr]	50.8	50.6	49.9	47.6	48.1	48.8	51.4	49.9	47.9	48.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.8	1.8	1.8	1.8	1.1	1.8	1.8
Total Energy [GJ/yr]	99.2	99	99.2	98.8	99.3	98.7	92.3	98.3	99.1	97.9
Design Heating Load [W]	9775.2	9793.1	9679.6	9362.7	9355.9	9469.4	9347.4	9679.6	9373.9	9469.4
Annual Energy Electricity [kWh/yr]	7681.2	7680.2	7676.8	7854	7856.5	7860	7872.7	7676.8	7855.6	7860
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,023.57	$ 1,023.43	$ 1,022.95	$ 1,048.03	$ 1,048.38	$ 1,048.88	$ 1,050.67	$ 1,022.95	$ 1,048.25	$ 1,048.88
Annual Energy Natural Gas [m3/yr]	1921.9	1916.8	1920.4	1893.6	1906.5	1890.8	1716.4	1898.4	1901.6	1868.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 829.04	$ 826.84	$ 828.39	$ 816.83	$ 822.4	$ 815.63	$ 740.4	$ 818.9	$ 820.28	$ 806.18
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18093	20955	21224	17857	18109	17840	17842	21225	20971	17841
Upgrade Package List	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101032	Pkg2231102031	Pkg2231101032	Pkg2221101032
GHGI [kg/m2]	7.37	7.35	7.36	7.26	7.31	7.25	6.6	7.28	7.29	7.17
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.1	26	25.6	24.4	24.7	25.1	26.4	25.6	24.6	25.1
Output: MEUI [kWh/(m2 * yr)]	40	39.9	40	39.8	40	39.7	36.2	39.5	39.9	39.3
Output: Better than ERS (%)	2080.0%	2090.0%	2080.0%	2110.0%	2070.0%	2120.0%	2310.0%	2150.0%	2080.0%	2180.0%
Output: Better than Envelope (%)	2230.0%	2270.0%	2360.0%	2720.0%	2650.0%	2540.0%	2150.0%	2360.0%	2670.0%	2540.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	860	861	864	687	684	681	668	864	685	681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 121.23	$ 121.37	$ 121.85	$ 96.87	$ 96.51	$ 96.02	$ 94.23	$ 121.85	$ 96.64	$ 96.02
Annual savings in carbon tax for electricity [$/year]	$ .43	$ .43	$ .43	$ .34	$ .34	$ .34	$ .33	$ .43	$ .34	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 121.66	$ 121.8	$ 122.28	$ 97.21	$ 96.86	$ 96.36	$ 94.56	$ 122.28	$ 96.98	$ 96.36
Annual savings in GHG from electricity savings [kg CO2e/year]	9.5	9.5	9.5	7.6	7.5	7.5	7.4	9.5	7.5	7.5
Annual savings in natural gas [m3/year]	55.12	55.31	55.18	56.18	55.7	56.28	62.78	56	55.88	57.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 510.73	$ 512.49	$ 511.25	$ 520.5	$ 516.05	$ 521.47	$ 581.67	$ 518.84	$ 517.74	$ 529.02
Annual savings in carbon tax for natural gas [$/year]	$ 127.48	$ 127.91	$ 127.6	$ 129.91	$ 128.8	$ 130.16	$ 145.18	$ 129.5	$ 129.22	$ 132.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 638.2	$ 640.4	$ 638.85	$ 650.41	$ 644.85	$ 651.62	$ 726.85	$ 648.34	$ 646.96	$ 661.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	2832.8	2842.6	2835.7	2887	2862.3	2892.3	3226.3	2877.8	2871.7	2934.3
Net Present Value [$]	$ 1,202.64	$ 1,375.32	$ 1,558.14	$ 1,898.86	$ 2,034.91	$ 2,000.85	$ 622.8	$ 1,673.97	$ 2,209.46	$ 2,117.65
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$.	$ 850.

LARGE Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 17,593.73	$ 17,647.29	$ 19,607.29	$ 21,962.21	$ 18,143.73	$ 18,197.29	$ 18,443.73	$ 18,108.78	$ 18,497.29	$ 20,157.29
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,593.73	$ 17,647.29	$ 19,607.29	$ 21,962.21	$ 18,143.73	$ 18,197.29	$ 18,443.73	$ 18,108.78	$ 18,497.29	$ 20,157.29
Net Present Value [$]	$ 5,246.79	$ 4,705.12	$ 4,672.1	$ 9,849.62	$ 5,510.23	$ 4,968.56	$ 5,626.79	$ 5,020.36	$ 5,085.12	$ 4,980.85
Incremental dollars per GHG saving	$ 3.35	$ 3.36	$ 3.4	$ 3.41	$ 3.42	$ 3.43	$ 3.45	$ 3.45	$ 3.45	$ 3.46
Auxiliary Energy Required Heating [GJ/yr]	48.9	48.6	48.4	49.2	48.9	48.6	48.9	47.9	48.6	48.4
Annual Energy DHW [GJ/yr]	23.7	23.7	13.5	7.8	22.5	22.5	21.7	23.8	21.7	12.4
Annual Energy Space Heating [GJ/yr]	17.1	16.9	16.8	17.2	17.1	16.9	17.1	16.7	16.9	16.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.1	1.8	1.8	1.8	1.1	1.8	1.1	1.1	1.8
Total Energy [GJ/yr]	69.6	68.8	58.9	53.7	68.3	67.5	67.5	68.6	66.7	57.9
Design Heating Load [W]	9852.7	9932.5	9390.5	9197.5	9852.7	9932.5	9852.7	9819	9932.5	9390.5
Annual Energy Electricity [kWh/yr]	12737.3	12505.8	12628.4	14902.9	12737.3	12505.8	12737.3	12448.7	12505.8	12629.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,739.01	$ 1,706.26	$ 1,723.6	$ 2,045.45	$ 1,739.01	$ 1,706.26	$ 1,739.01	$ 1,698.18	$ 1,706.26	$ 1,723.73
Annual Energy Natural Gas [m3/yr]	637.6	637.7	362.1	0	603.4	603.5	581.5	637.8	581.6	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.04	$ 275.08	$ 156.2	$.	$ 260.29	$ 260.33	$ 250.84	$ 275.12	$ 250.88	$ 143.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	13384	17830	17851	21274	13385	17831	13386	18100	17832	17852
Upgrade Package List	Pkg2131102033	Pkg2221101031	Pkg2221101032	Pkg2231102033	Pkg2131102033	Pkg2221101031	Pkg2131102033	Pkg2221102031	Pkg2221101031	Pkg2221101032
GHGI [kg/m2]	2.66	2.66	1.63	0.32	2.54	2.53	2.45	2.66	2.45	1.52
% ICC	1.6%	1.6%	1.7%	1.9%	1.6%	1.6%	1.6%	1.6%	1.6%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.6	26.4	26.3	26.7	26.6	26.4	26.6	26	26.4	26.3
Output: MEUI [kWh/(m2 * yr)]	23.8	23.4	18	15.2	23.1	22.7	22.7	23.3	22.2	17.5
Output: Better than ERS (%)	4410.0%	4470.0%	5060.0%	5490.0%	4510.0%	4580.0%	4580.0%	4490.0%	4640.0%	5140.0%
Output: Better than Envelope (%)	2090.0%	2140.0%	2170.0%	2040.0%	2090.0%	2140.0%	2090.0%	2250.0%	2140.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4196	3965	4087	6362	4196	3965	4196	3908	3965	4088
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 591.68	$ 559.04	$ 576.32	$ 897.03	$ 591.68	$ 559.04	$ 591.68	$ 550.99	$ 559.04	$ 576.45
Annual savings in carbon tax for electricity [$/year]	$ 2.1	$ 1.98	$ 2.04	$ 3.18	$ 2.1	$ 1.98	$ 2.1	$ 1.95	$ 1.98	$ 2.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 593.78	$ 561.02	$ 578.37	$ 900.21	$ 593.78	$ 561.02	$ 593.78	$ 552.94	$ 561.02	$ 578.49
Annual savings in GHG from electricity savings [kg CO2e/year]	46.2	43.6	45	70	46.2	43.6	46.2	43	43.6	45
Annual savings in natural gas [m3/year]	102.98	102.97	113.24	126.73	104.25	104.25	105.07	102.97	105.06	114.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 954.07	$ 954.04	$ 1,049.18	$ 1,174.18	$ 965.88	$ 965.85	$ 973.44	$ 954.01	$ 973.41	$ 1,059.22
Annual savings in carbon tax for natural gas [$/year]	$ 238.13	$ 238.12	$ 261.87	$ 293.07	$ 241.08	$ 241.07	$ 242.97	$ 238.12	$ 242.96	$ 264.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,192.21	$ 1,192.16	$ 1,311.05	$ 1,467.25	$ 1,206.96	$ 1,206.92	$ 1,216.41	$ 1,192.12	$ 1,216.36	$ 1,323.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	5291.8	5291.6	5819.3	6512.6	5357.3	5357.1	5399.2	5291.4	5399.1	5875
Net Present Value [$]	$ 5,246.79	$ 4,705.12	$ 4,672.1	$ 9,849.62	$ 5,510.23	$ 4,968.56	$ 5,626.79	$ 5,020.36	$ 5,085.12	$ 4,980.85
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	10.47	8.77	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	5.28	5.28	3.87	5.28	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 6,446.45	$ 9,440.93	$ 6,446.45	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	NA	HRV sre 60	HRV sre 75	HRV sre 75	NA	HRV sre 75	NA	NA	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$.	$ 1,360.	$ 1,800.	$ 1,800.	$.	$ 1,800.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$ 600.	$ 1,374.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$.	$ 850.	$ 550.

LARGE Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BC1GasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,457.29	$ 16,897.29	$ 16,918.78	$ 17,007.29	$ 17,307.29	$ 17,358.78	$ 17,447.29	$ 17,136.72	$ 15,808.78	$ 17,468.78
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,457.29	$ 16,897.29	$ 16,918.78	$ 17,007.29	$ 17,307.29	$ 17,358.78	$ 17,447.29	$ 17,136.72	$ 15,808.78	$ 17,468.78
Net Present Value [$]	$ 622.8	$ 781.64	$ 917.5	$ 930.88	$ 1,075.83	$ 1,077.44	$ 1,089.67	$ 1,095.64	$ 1,202.64	$ 1,225.58
Incremental dollars per GHG saving	$ 5.09	$ 5.13	$ 5.17	$ 5.17	$ 5.21	$ 5.21	$ 5.21	$ 5.23	$ 5.56	$ 5.25
Auxiliary Energy Required Heating [GJ/yr]	48.5	47.3	47.8	48.5	48.5	46.7	47.4	47.6	48	47.8
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	11.7	13.5	12.4	13.5	21.7	12.4
Annual Energy Space Heating [GJ/yr]	51.4	50.2	50.6	51.4	51.4	49.4	50.2	50.5	50.8	50.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.1	1.8
Total Energy [GJ/yr]	92.3	91.1	91.5	91.2	90.5	90.3	90	91.4	99.2	90.5
Design Heating Load [W]	9347.4	9240.7	9233.9	9347.4	9347.4	9127.2	9240.7	9251.8	9775.2	9233.9
Annual Energy Electricity [kWh/yr]	7872.7	7866.6	7869.1	7872.7	7872.7	7863.1	7866.7	7868.2	7681.2	7869.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,050.67	$ 1,049.81	$ 1,050.16	$ 1,050.67	$ 1,050.67	$ 1,049.31	$ 1,049.82	$ 1,050.04	$ 1,023.57	$ 1,050.16
Annual Energy Natural Gas [m3/yr]	1716.4	1684.7	1697.6	1687.5	1669	1666	1655.8	1693.1	1921.9	1668.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 740.4	$ 726.72	$ 732.29	$ 727.93	$ 719.95	$ 718.65	$ 714.25	$ 730.34	$ 829.04	$ 719.82
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17842	17860	18112	17843	17844	18130	17861	20974	18093	18113
Upgrade Package List	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101032	Pkg2221102033	Pkg2221101033	Pkg2231101032	Pkg2221102031	Pkg2221102032
GHGI [kg/m2]	6.6	6.48	6.53	6.49	6.42	6.41	6.37	6.51	7.37	6.42
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.4	25.7	26	26.4	26.4	25.4	25.7	25.9	26.1	26
Output: MEUI [kWh/(m2 * yr)]	36.2	35.6	35.8	35.6	35.3	35.2	35	35.7	40	35.3
Output: Better than ERS (%)	2310.0%	2410.0%	2380.0%	2400.0%	2460.0%	2480.0%	2500.0%	2380.0%	2080.0%	2460.0%
Output: Better than Envelope (%)	2150.0%	2350.0%	2270.0%	2150.0%	2150.0%	2440.0%	2330.0%	2300.0%	2230.0%	2270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	668	674	672	668	668	678	674	673	860	672
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 94.23	$ 95.09	$ 94.74	$ 94.23	$ 94.23	$ 95.58	$ 95.08	$ 94.86	$ 121.23	$ 94.74
Annual savings in carbon tax for electricity [$/year]	$ .33	$ .34	$ .34	$ .33	$ .33	$ .34	$ .34	$ .34	$ .43	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 94.56	$ 95.43	$ 95.07	$ 94.56	$ 94.56	$ 95.92	$ 95.41	$ 95.2	$ 121.66	$ 95.07
Annual savings in GHG from electricity savings [kg CO2e/year]	7.4	7.4	7.4	7.4	7.4	7.5	7.4	7.4	9.5	7.4
Annual savings in natural gas [m3/year]	62.78	63.96	63.48	63.86	64.55	64.66	65.04	63.65	55.12	64.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 581.67	$ 592.61	$ 588.16	$ 591.64	$ 598.03	$ 599.07	$ 602.59	$ 589.71	$ 510.73	$ 598.13
Annual savings in carbon tax for natural gas [$/year]	$ 145.18	$ 147.91	$ 146.8	$ 147.67	$ 149.27	$ 149.52	$ 150.4	$ 147.19	$ 127.48	$ 149.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 726.85	$ 740.52	$ 734.96	$ 739.32	$ 747.3	$ 748.59	$ 752.99	$ 736.9	$ 638.2	$ 747.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	3226.3	3287	3262.3	3281.6	3317	3322.8	3342.3	3270.9	2832.8	3317.6
Net Present Value [$]	$ 622.8	$ 781.64	$ 917.5	$ 930.88	$ 1,075.83	$ 1,077.44	$ 1,089.67	$ 1,095.64	$ 1,202.64	$ 1,225.58
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$ 550.

LARGE Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 36,249.1	$ 36,689.1	$ 36,710.59	$ 36,799.1	$ 36,928.53	$ 37,099.1	$ 37,150.59	$ 37,189.1	$ 37,239.1	$ 37,243.08
ICC with multiplier (Van=1.0,this Cz =1)	$ 36,249.1	$ 36,689.1	$ 36,710.59	$ 36,799.1	$ 36,928.53	$ 37,099.1	$ 37,150.59	$ 37,189.1	$ 37,239.1	$ 37,243.08
Net Present Value [$]	$ 20,017.77	$ 20,176.41	$ 20,340.5	$ 20,282.18	$ 20,512.19	$ 20,397.77	$ 20,544.11	$ 20,510.8	$ 20,440.09	$ 21,011.75
Incremental dollars per GHG saving	$ 6.89	$ 6.97	$ 6.98	$ 6.91	$ 7.02	$ 6.91	$ 7.06	$ 7.07	$ 6.99	$ 7.08
Auxiliary Energy Required Heating [GJ/yr]	33.5	32.4	32.8	33.5	32.7	33.5	31.7	31.7	32.4	33.5
Annual Energy DHW [GJ/yr]	23.8	23.8	23.8	22.5	23.8	21.7	23.8	23.8	22.5	23.8
Annual Energy Space Heating [GJ/yr]	11.7	11.3	11.5	11.7	11.4	11.7	11.1	11	11.3	11.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	64.2	63.8	64	62.9	63.9	62.1	63.7	63.6	62.5	64.2
Design Heating Load [W]	7885.1	7778.4	7771.6	7885.1	7789.5	7885.1	7664.9	7755.5	7778.4	7885.1
Annual Energy Electricity [kWh/yr]	11226.9	11117.3	11172.7	11226.9	11155.7	11226.9	11080.5	11053	11117.3	11226.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,525.29	$ 1,509.78	$ 1,517.62	$ 1,525.29	$ 1,515.22	$ 1,525.29	$ 1,504.58	$ 1,500.68	$ 1,509.78	$ 1,525.29
Annual Energy Natural Gas [m3/yr]	638.1	638.2	638.2	604	637.9	582	638.3	638.2	604	638.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.25	$ 275.3	$ 275.3	$ 260.54	$ 275.17	$ 251.05	$ 275.34	$ 275.3	$ 260.54	$ 275.25
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43534	43552	43750	43535	45478	43536	43768	43570	43553	44182
Upgrade Package List	Pkg3321201052	Pkg3321201053	Pkg3321202052	Pkg3321201052	Pkg3331201052	Pkg3321201052	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321301052
GHGI [kg/m2]	2.63	2.63	2.63	2.5	2.63	2.42	2.63	2.63	2.5	2.63
% ICC	3.2%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.2	17.6	17.8	18.2	17.8	18.2	17.2	17.2	17.6	18.2
Output: MEUI [kWh/(m2 * yr)]	20.9	20.7	20.8	20.2	20.7	19.8	20.6	20.6	20	20.9
Output: Better than ERS (%)	4840.0%	4880.0%	4860.0%	4950.0%	4870.0%	5010.0%	4880.0%	4890.0%	4980.0%	4840.0%
Output: Better than Envelope (%)	4580.0%	4760.0%	4690.0%	4580.0%	4710.0%	4580.0%	4870.0%	4870.0%	4760.0%	4580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2686	2576	2632	2686	2615	2686	2540	2512	2576	2686
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 378.71	$ 363.26	$ 371.07	$ 378.71	$ 368.67	$ 378.71	$ 358.07	$ 354.19	$ 363.26	$ 378.71
Annual savings in carbon tax for electricity [$/year]	$ 1.34	$ 1.29	$ 1.32	$ 1.34	$ 1.31	$ 1.34	$ 1.27	$ 1.26	$ 1.29	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 380.05	$ 364.55	$ 372.39	$ 380.05	$ 369.98	$ 380.05	$ 359.34	$ 355.45	$ 364.55	$ 380.05
Annual savings in GHG from electricity savings [kg CO2e/year]	29.5	28.3	28.9	29.5	28.8	29.5	27.9	27.6	28.3	29.5
Annual savings in natural gas [m3/year]	102.96	102.95	102.95	104.23	102.97	105.05	102.95	102.95	104.23	102.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 953.9	$ 953.87	$ 953.87	$ 965.67	$ 953.97	$ 973.27	$ 953.83	$ 953.87	$ 965.67	$ 953.9
Annual savings in carbon tax for natural gas [$/year]	$ 238.09	$ 238.08	$ 238.08	$ 241.03	$ 238.11	$ 242.92	$ 238.07	$ 238.08	$ 241.03	$ 238.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,191.99	$ 1,191.95	$ 1,191.95	$ 1,206.7	$ 1,192.08	$ 1,216.19	$ 1,191.91	$ 1,191.95	$ 1,206.7	$ 1,191.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	5290.9	5290.7	5290.7	5356.2	5291.3	5398.3	5290.5	5290.7	5356.2	5290.9
Net Present Value [$]	$ 20,017.77	$ 20,176.41	$ 20,340.5	$ 20,282.18	$ 20,512.19	$ 20,397.77	$ 20,544.11	$ 20,510.8	$ 20,440.09	$ 21,011.75
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.

LARGE Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 38,250.59	$ 38,430.02	$ 38,800.59	$ 38,468.53	$ 39,100.59	$ 43,029.22	$ 38,980.02	$ 39,018.53	$ 39,280.02	$ 39,318.53
ICC with multiplier (Van=1.0,this Cz =1)	$ 38,250.59	$ 38,430.02	$ 38,800.59	$ 38,468.53	$ 39,100.59	$ 43,029.22	$ 38,980.02	$ 39,018.53	$ 39,280.02	$ 39,318.53
Net Present Value [$]	$ 19,681.04	$ 19,845.32	$ 19,989.62	$ 19,857.35	$ 20,134.14	$ 27,031.77	$ 20,153.71	$ 20,165.74	$ 20,298.42	$ 20,310.27
Incremental dollars per GHG saving	$ 6.61	$ 6.64	$ 6.64	$ 6.64	$ 6.65	$ 6.66	$ 6.67	$ 6.68	$ 6.68	$ 6.69
Auxiliary Energy Required Heating [GJ/yr]	33.3	33.2	33.3	33.2	33.3	33.1	33.2	33.2	33.2	33.2
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	7.8	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	53.9	53.8	52.8	53.8	52.1	48.2	52.8	52.7	52.1	52
Design Heating Load [W]	7520.9	7448.2	7520.9	7538.8	7520.9	7159.3	7448.2	7538.8	7448.2	7538.8
Annual Energy Electricity [kWh/yr]	11216.7	11210.8	11217.5	11200.5	11218	13393.9	11211.6	11201.3	11212.1	11201.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,523.85	$ 1,523.01	$ 1,523.96	$ 1,521.56	$ 1,524.03	$ 1,831.92	$ 1,523.13	$ 1,521.67	$ 1,523.2	$ 1,521.74
Annual Energy Natural Gas [m3/yr]	362.1	362.1	333	362.1	314.3	0	333	333	314.3	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$.	$ 143.64	$ 143.64	$ 135.58	$ 135.58
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43789	45715	43790	45517	43791	51802	45716	45518	45717	45519
Upgrade Package List	Pkg3321202054	Pkg3331202053	Pkg3321202054	Pkg3331201054	Pkg3321202054	Pkg4331303054	Pkg3331202053	Pkg3331201054	Pkg3331202053	Pkg3331201054
GHGI [kg/m2]	1.6	1.6	1.49	1.6	1.42	0.29	1.49	1.49	1.42	1.42
% ICC	3.4%	3.4%	3.4%	3.4%	3.5%	3.8%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.1	18.1	18.1	18	18.1	18	18.1	18	18.1	18
Output: MEUI [kWh/(m2 * yr)]	15.3	15.3	14.7	15.3	14.3	12.2	14.7	14.7	14.3	14.3
Output: Better than ERS (%)	5480.0%	5490.0%	5570.0%	5490.0%	5630.0%	5950.0%	5570.0%	5580.0%	5630.0%	5640.0%
Output: Better than Envelope (%)	4610.0%	4630.0%	4610.0%	4630.0%	4610.0%	4640.0%	4630.0%	4630.0%	4630.0%	4630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2676	2670	2676	2660	2677	4853	2671	2660	2671	2661
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 377.27	$ 376.44	$ 377.39	$ 374.99	$ 377.46	$ 684.26	$ 376.55	$ 375.1	$ 376.63	$ 375.17
Annual savings in carbon tax for electricity [$/year]	$ 1.34	$ 1.33	$ 1.34	$ 1.33	$ 1.34	$ 2.43	$ 1.34	$ 1.33	$ 1.34	$ 1.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 378.61	$ 377.78	$ 378.72	$ 376.32	$ 378.8	$ 686.69	$ 377.89	$ 376.43	$ 377.96	$ 376.5
Annual savings in GHG from electricity savings [kg CO2e/year]	29.4	29.4	29.4	29.3	29.4	53.4	29.4	29.3	29.4	29.3
Annual savings in natural gas [m3/year]	113.24	113.24	114.33	113.24	115.02	126.73	114.33	114.33	115.02	115.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,049.18	$ 1,049.18	$ 1,059.22	$ 1,049.18	$ 1,065.68	$ 1,174.18	$ 1,059.22	$ 1,059.22	$ 1,065.68	$ 1,065.68
Annual savings in carbon tax for natural gas [$/year]	$ 261.87	$ 261.87	$ 264.38	$ 261.87	$ 265.99	$ 293.07	$ 264.38	$ 264.38	$ 265.99	$ 265.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,311.05	$ 1,311.05	$ 1,323.6	$ 1,311.05	$ 1,331.67	$ 1,467.25	$ 1,323.6	$ 1,323.6	$ 1,331.67	$ 1,331.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	5819.3	5819.3	5875	5819.3	5910.9	6512.6	5875	5875	5910.9	5910.9
Net Present Value [$]	$ 19,681.04	$ 19,845.32	$ 19,989.62	$ 19,857.35	$ 20,134.14	$ 27,031.77	$ 20,153.71	$ 20,165.74	$ 20,298.42	$ 20,310.27
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	8.77	10.47	14.09	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 39,655.22	$ 39,955.22	$ 40,225.67	$ 40,294.21	$ 38,250.59	$ 40,594.21	$ 38,430.02	$ 38,468.53	$ 38,800.59	$ 36,249.1
ICC with multiplier (Van=1.0,this Cz =1)	$ 39,655.22	$ 39,955.22	$ 40,225.67	$ 40,294.21	$ 38,250.59	$ 40,594.21	$ 38,430.02	$ 38,468.53	$ 38,800.59	$ 36,249.1
Net Present Value [$]	$ 19,020.37	$ 19,165.32	$ 19,519.19	$ 19,659.36	$ 19,681.04	$ 19,804.31	$ 19,845.32	$ 19,857.35	$ 19,989.62	$ 20,017.77
Incremental dollars per GHG saving	$ 9.28	$ 9.27	$ 9.37	$ 9.43	$ 6.61	$ 9.42	$ 6.64	$ 6.64	$ 6.64	$ 6.89
Auxiliary Energy Required Heating [GJ/yr]	30.1	30.1	30.4	30.1	33.3	30.1	33.2	33.2	33.3	33.5
Annual Energy DHW [GJ/yr]	12.4	11.7	11.7	12.4	13.5	11.7	13.5	13.5	12.4	23.8
Annual Energy Space Heating [GJ/yr]	31.9	31.9	32.2	31.9	11.6	31.9	11.6	11.6	11.6	11.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	71.7	71	71.3	71.7	53.9	71	53.8	53.8	52.8	64.2
Design Heating Load [W]	7013.1	7013.1	7013.6	7013.1	7520.9	7013.1	7448.2	7538.8	7520.9	7885.1
Annual Energy Electricity [kWh/yr]	7775.4	7775.4	7777.2	7775.4	11216.7	7775.4	11210.8	11200.5	11217.5	11226.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,036.9	$ 1,036.9	$ 1,037.16	$ 1,036.9	$ 1,523.85	$ 1,036.9	$ 1,523.01	$ 1,521.56	$ 1,523.96	$ 1,525.29
Annual Energy Natural Gas [m3/yr]	1173.2	1154.7	1164.1	1173.2	362.1	1154.7	362.1	362.1	333	638.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 506.08	$ 498.1	$ 502.15	$ 506.08	$ 156.2	$ 498.1	$ 156.2	$ 156.2	$ 143.64	$ 275.25
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51791	51792	52224	52079	43789	52080	45715	45517	43790	43534
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4341302054	Pkg4331403054	Pkg3321202054	Pkg4331403054	Pkg3331202053	Pkg3331201054	Pkg3321202054	Pkg3321201052
GHGI [kg/m2]	4.56	4.49	4.53	4.56	1.6	4.49	1.6	1.6	1.49	2.63
% ICC	3.5%	3.5%	3.6%	3.6%	3.4%	3.6%	3.4%	3.4%	3.4%	3.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	16.4	16.4	16.5	16.4	18.1	16.4	18.1	18	18.1	18.2
Output: MEUI [kWh/(m2 * yr)]	25	24.7	24.9	25	15.3	24.7	15.3	15.3	14.7	20.9
Output: Better than ERS (%)	4020.0%	4080.0%	4060.0%	4020.0%	5480.0%	4080.0%	5490.0%	5490.0%	5570.0%	4840.0%
Output: Better than Envelope (%)	5130.0%	5130.0%	5080.0%	5130.0%	4610.0%	5130.0%	4630.0%	4630.0%	4610.0%	4580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	766	766	764	766	2676	766	2670	2660	2676	2686
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 107.95	$ 107.95	$ 107.7	$ 107.95	$ 377.27	$ 107.95	$ 376.44	$ 374.99	$ 377.39	$ 378.71
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .38	$ .38	$ 1.34	$ .38	$ 1.33	$ 1.33	$ 1.34	$ 1.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 108.33	$ 108.33	$ 108.08	$ 108.33	$ 378.61	$ 108.33	$ 377.78	$ 376.32	$ 378.72	$ 380.05
Annual savings in GHG from electricity savings [kg CO2e/year]	8.4	8.4	8.4	8.4	29.4	8.4	29.4	29.3	29.4	29.5
Annual savings in natural gas [m3/year]	83.02	83.71	83.36	83.02	113.24	83.71	113.24	113.24	114.33	102.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 769.18	$ 775.57	$ 772.32	$ 769.18	$ 1,049.18	$ 775.57	$ 1,049.18	$ 1,049.18	$ 1,059.22	$ 953.9
Annual savings in carbon tax for natural gas [$/year]	$ 191.98	$ 193.58	$ 192.77	$ 191.98	$ 261.87	$ 193.58	$ 261.87	$ 261.87	$ 264.38	$ 238.09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 961.17	$ 969.15	$ 965.09	$ 961.17	$ 1,311.05	$ 969.15	$ 1,311.05	$ 1,311.05	$ 1,323.6	$ 1,191.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	4266.3	4301.7	4283.7	4266.3	5819.3	4301.7	5819.3	5819.3	5875	5290.9
Net Present Value [$]	$ 19,020.37	$ 19,165.32	$ 19,519.19	$ 19,659.36	$ 19,681.04	$ 19,804.31	$ 19,845.32	$ 19,857.35	$ 19,989.62	$ 20,017.77
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.47	14.09	10.47	14.09	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR10	BC EffR20	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 3,141.69	$ 4,774.66	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	NBC gas furnace	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.

LARGE Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 11,002.81	$ 11,464.3	$ 11,502.81	$ 11,552.81	$ 11,602.81	$ 11,682.24	$ 11,761.47	$ 11,770.91	$ 11,824.47	$ 11,852.81
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 11,806.02	$ 12,301.19	$ 12,342.52	$ 12,396.17	$ 12,449.82	$ 12,535.04	$ 12,620.06	$ 12,630.19	$ 12,687.66	$ 12,718.07
Net Present Value [$]	$ 2,110.57	$ 1,845.96	$ 3,238.11	$ 1,847.13	$ 3,280.39	$ 1,672.13	$ 1,589.32	$ 92.85	$ 468.86	$ 1,730.57
Incremental dollars per GHG saving	$ 4.38	$ 4.49	$ 4.01	$ 4.48	$ 3.97	$ 4.55	$ 4.59	$ 5.1	$ 5.06	$ 4.52
Auxiliary Energy Required Heating [GJ/yr]	76.1	75.3	69.6	76.1	78.3	75.2	75.2	80	79.5	76.1
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	13.5	23.7	23.7	23.7	23.7	21.6
Annual Energy Space Heating [GJ/yr]	80.6	79.8	73.7	80.6	82.9	79.6	79.6	84.7	84.2	80.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	131.1	130.3	124.2	129.8	123.2	130.1	130.1	135.9	134.6	129
Design Heating Load [W]	14826.5	14681.7	13563.2	14826.5	14633.8	14712.6	13563.2	13617.8	13711.7	14826.5
Annual Energy Electricity [kWh/yr]	7830.2	7826	7795.4	7830.2	7841.6	7825.1	7825.2	8039.3	7847.8	7830.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,044.66	$ 1,044.06	$ 1,039.73	$ 1,044.66	$ 1,046.27	$ 1,043.94	$ 1,043.95	$ 1,074.25	$ 1,047.15	$ 1,044.66
Annual Energy Natural Gas [m3/yr]	2764	2741.8	2580.4	2729.8	2549.2	2736.8	2737.2	2871.1	2856.5	2707.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,192.29	$ 1,182.72	$ 1,113.09	$ 1,177.54	$ 1,099.64	$ 1,180.56	$ 1,180.73	$ 1,238.49	$ 1,232.19	$ 1,168.09
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1729	1999	11449	1730	1732	3349	11395	13267	17713	1731
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131101031	Pkg2121101021	Pkg2131102013	Pkg2221101011	Pkg1121101031
GHGI [kg/m2]	10.53	10.44	9.84	10.4	9.72	10.42	10.42	10.93	10.87	10.32
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	41.4	41	37.8	41.4	42.6	40.9	40.9	43.5	43.2	41.4
Output: MEUI [kWh/(m2 * yr)]	57.3	56.9	53.6	56.7	58	56.8	56.8	59.9	59.3	56.2
Output: Better than ERS (%)	1000.0%	1050.0%	1470.0%	1090.0%	1190.0%	1060.0%	1060.0%	670.0%	760.0%	1140.0%
Output: Better than Envelope (%)	280.0%	180.0%	590.0%	280.0%	580.0%	160.0%	160.0%	810.0%	740.0%	280.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	838	842	873	838	827	843	843	629	821	838
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 118.2	$ 118.79	$ 123.11	$ 118.2	$ 116.59	$ 118.92	$ 118.91	$ 88.72	$ 115.72	$ 118.2
Annual savings in carbon tax for electricity [$/year]	$ .42	$ .42	$ .44	$ .42	$ .41	$ .42	$ .42	$ .31	$ .41	$ .42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 118.62	$ 119.21	$ 123.54	$ 118.62	$ 117.01	$ 119.34	$ 119.33	$ 89.03	$ 116.13	$ 118.62
Annual savings in GHG from electricity savings [kg CO2e/year]	9.2	9.3	9.6	9.2	9.1	9.3	9.3	6.9	9	9.2
Annual savings in natural gas [m3/year]	48.73	49.56	55.57	50.01	56.73	49.74	49.73	44.74	45.28	50.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 451.49	$ 459.16	$ 514.87	$ 463.3	$ 525.64	$ 460.88	$ 460.74	$ 414.52	$ 419.56	$ 470.86
Annual savings in carbon tax for natural gas [$/year]	$ 112.69	$ 114.6	$ 128.51	$ 115.64	$ 131.2	$ 115.03	$ 115.	$ 103.46	$ 104.72	$ 117.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 564.18	$ 573.76	$ 643.38	$ 578.94	$ 656.84	$ 575.92	$ 575.74	$ 517.98	$ 524.28	$ 588.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	2504.2	2546.7	2855.8	2569.7	2915.5	2556.3	2555.5	2299.2	2327.1	2611.6
Net Present Value [$]	$ 2,110.57	$ 1,845.96	$ 3,238.11	$ 1,847.13	$ 3,280.39	$ 1,672.13	$ 1,589.32	$ 92.85	$ 468.86	$ 1,730.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	NA	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$.	$.	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 9,440.93	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.	$ 850.

LARGE Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,026.81	$ 14,752.81	$ 16,488.3	$ 16,576.81	$ 15,302.81	$ 15,214.3	$ 15,252.81	$ 16,706.24	$ 14,152.81	$ 16,876.81
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,196.77	$ 15,829.77	$ 17,691.95	$ 17,786.92	$ 16,419.92	$ 16,324.94	$ 16,366.27	$ 17,925.8	$ 15,185.97	$ 18,108.82
Net Present Value [$]	$ 10,109.55	$ 6,972.42	$ 10,366.72	$ 10,196.51	$ 7,280.21	$ 7,235.99	$ 5,473.12	$ 10,435.67	$ 8,184.45	$ 10,098.66
Incremental dollars per GHG saving	$ 2.09	$ 2.11	$ 2.15	$ 2.16	$ 2.17	$ 2.17	$ 2.18	$ 2.18	$ 2.19	$ 2.2
Auxiliary Energy Required Heating [GJ/yr]	75.3	78.1	74.5	75.1	78.1	77.3	71.6	74.4	76	74.9
Annual Energy DHW [GJ/yr]	7.8	13.5	7.8	7.3	12.4	13.5	13.5	7.8	23.7	6.9
Annual Energy Space Heating [GJ/yr]	31.3	32.3	31	31.2	32.3	32	29.5	30.8	31.6	31
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	70.6	77.3	70.3	70	76.2	77	74.5	70.1	86.8	69.4
Design Heating Load [W]	13620.9	14694.3	13476.1	13620.9	14694.3	14549.5	13427.9	13507	14887.3	13620.9
Annual Energy Electricity [kWh/yr]	19618.4	17716.6	19539.1	19438.6	17717.5	17639.7	16940	19481.2	17524.4	19284
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,712.69	$ 2,443.58	$ 2,701.47	$ 2,687.25	$ 2,443.71	$ 2,432.7	$ 2,333.69	$ 2,693.27	$ 2,416.39	$ 2,665.37
Annual Energy Natural Gas [m3/yr]	0	362.1	0	0	332.9	362.1	362.1	0	637.5	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 156.2	$.	$.	$ 143.6	$ 156.2	$ 156.2	$.	$ 275.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	1741	11734	11465	1742	2011	11461	13084	1738	11466
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121102031	Pkg2121101031	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg2131101031	Pkg1121101031	Pkg2121101031
GHGI [kg/m2]	0.42	1.74	0.42	0.42	1.63	1.74	1.72	0.42	2.77	0.42
% ICC	1.4%	1.3%	1.5%	1.5%	1.4%	1.3%	1.4%	1.5%	1.3%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	40.9	42.5	40.5	40.8	42.5	42	38.9	40.4	41.3	40.7
Output: MEUI [kWh/(m2 * yr)]	24	27.6	23.9	23.7	27.1	27.5	26.1	23.8	32.8	23.4
Output: Better than ERS (%)	5040.0%	4570.0%	5060.0%	5080.0%	4650.0%	4590.0%	4760.0%	5080.0%	4140.0%	5130.0%
Output: Better than Envelope (%)	180.0%	550.0%	70.0%	150.0%	550.0%	450.0%	320.0%	50.0%	270.0%	120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10950	9048	10871	10770	9049	8971	8272	10813	8856	10616
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,543.94	$ 1,275.78	$ 1,532.75	$ 1,518.58	$ 1,275.91	$ 1,264.94	$ 1,166.28	$ 1,524.59	$ 1,248.68	$ 1,496.79
Annual savings in carbon tax for electricity [$/year]	$ 5.47	$ 4.52	$ 5.44	$ 5.39	$ 4.52	$ 4.49	$ 4.14	$ 5.41	$ 4.43	$ 5.31
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,549.41	$ 1,280.31	$ 1,538.19	$ 1,523.97	$ 1,280.43	$ 1,269.42	$ 1,170.42	$ 1,530.	$ 1,253.11	$ 1,502.09
Annual savings in GHG from electricity savings [kg CO2e/year]	120.4	99.5	119.6	118.5	99.5	98.7	91	118.9	97.4	116.8
Annual savings in natural gas [m3/year]	151.71	138.22	151.71	151.71	139.31	138.22	138.22	151.71	127.96	151.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,405.64	$ 1,280.64	$ 1,405.64	$ 1,405.64	$ 1,290.72	$ 1,280.64	$ 1,280.64	$ 1,405.64	$ 1,185.57	$ 1,405.64
Annual savings in carbon tax for natural gas [$/year]	$ 350.84	$ 319.64	$ 350.84	$ 350.84	$ 322.16	$ 319.64	$ 319.64	$ 350.84	$ 295.91	$ 350.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,756.48	$ 1,600.28	$ 1,756.48	$ 1,756.48	$ 1,612.87	$ 1,600.28	$ 1,600.28	$ 1,756.48	$ 1,481.48	$ 1,756.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	7796.4	7103.1	7796.4	7796.4	7159	7103.1	7103.1	7796.4	6575.8	7796.4
Net Present Value [$]	$ 10,109.55	$ 6,972.42	$ 10,366.72	$ 10,196.51	$ 7,280.21	$ 7,235.99	$ 5,473.12	$ 10,435.67	$ 8,184.45	$ 10,098.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.	$.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$.	$ 850.

LARGE Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,102.81	$ 12,564.3	$ 12,652.81	$ 12,782.24	$ 12,952.81	$ 13,114.3	$ 13,243.73	$ 13,414.3	$ 13,332.24	$ 13,632.24
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 12,986.32	$ 13,481.49	$ 13,576.47	$ 13,715.34	$ 13,898.37	$ 14,071.64	$ 14,210.52	$ 14,393.54	$ 14,305.49	$ 14,627.39
Net Present Value [$]	$ 4,409.63	$ 4,144.78	$ 4,100.64	$ 3,968.77	$ 3,956.42	$ 3,836.76	$ 3,703.91	$ 3,691.81	$ 3,660.32	$ 3,515.37
Incremental dollars per GHG saving	$ 3.69	$ 3.79	$ 3.8	$ 3.84	$ 3.85	$ 3.89	$ 3.93	$ 3.93	$ 3.94	$ 3.99
Auxiliary Energy Required Heating [GJ/yr]	71.7	70.9	71.7	70.8	71.7	70.9	70	70.9	70.8	70.8
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	13.5	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	76	75.1	76	74.9	76	75.1	74.1	75.1	75	75
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	116.2	115.3	115.1	115.2	114.4	114.3	114.3	113.6	114.1	113.4
Design Heating Load [W]	13371.1	13226.3	13371.1	13257.1	13371.1	13226.3	13112.4	13226.3	13257.1	13257.1
Annual Energy Electricity [kWh/yr]	7806.8	7802.6	7806.9	7801.7	7806.9	7802.7	7797.5	7802.7	7801.8	7801.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,041.35	$ 1,040.75	$ 1,041.36	$ 1,040.63	$ 1,041.36	$ 1,040.77	$ 1,040.03	$ 1,040.77	$ 1,040.64	$ 1,040.64
Annual Energy Natural Gas [m3/yr]	2365.4	2343.2	2336.6	2338.5	2318	2314.3	2316.3	2295.8	2309.6	2291.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,020.35	$ 1,010.77	$ 1,007.93	$ 1,008.75	$ 999.9	$ 998.31	$ 999.17	$ 990.33	$ 996.28	$ 988.3
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	13072	11454	11723	13342	11724	13073	13074
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2131101031
GHGI [kg/m2]	9.03	8.95	8.92	8.93	8.85	8.84	8.85	8.77	8.82	8.75
% ICC	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	39	38.6	39	38.5	39	38.6	38	38.6	38.5	38.5
Output: MEUI [kWh/(m2 * yr)]	49.2	48.8	48.7	48.7	48.3	48.2	48.2	47.8	48.1	47.7
Output: Better than ERS (%)	1690.0%	1760.0%	1770.0%	1770.0%	1820.0%	1830.0%	1830.0%	1880.0%	1840.0%	1890.0%
Output: Better than Envelope (%)	310.0%	420.0%	310.0%	430.0%	310.0%	420.0%	540.0%	420.0%	430.0%	430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	862	866	862	867	862	866	871	866	867	867
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 121.5	$ 122.09	$ 121.49	$ 122.22	$ 121.49	$ 122.08	$ 122.81	$ 122.08	$ 122.2	$ 122.2
Annual savings in carbon tax for electricity [$/year]	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43	$ .44	$ .43	$ .43	$ .43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 121.93	$ 122.52	$ 121.92	$ 122.65	$ 121.92	$ 122.51	$ 123.25	$ 122.51	$ 122.64	$ 122.64
Annual savings in GHG from electricity savings [kg CO2e/year]	9.5	9.5	9.5	9.5	9.5	9.5	9.6	9.5	9.5	9.5
Annual savings in natural gas [m3/year]	63.58	64.41	64.66	64.58	65.35	65.49	65.41	66.18	65.66	66.35
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 589.09	$ 596.75	$ 599.03	$ 598.38	$ 605.45	$ 606.73	$ 606.04	$ 613.12	$ 608.35	$ 614.74
Annual savings in carbon tax for natural gas [$/year]	$ 147.03	$ 148.95	$ 149.52	$ 149.35	$ 151.12	$ 151.44	$ 151.26	$ 153.03	$ 151.84	$ 153.44
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 736.12	$ 745.7	$ 748.55	$ 747.73	$ 756.57	$ 758.17	$ 757.3	$ 766.15	$ 760.19	$ 768.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	3267.4	3309.9	3322.6	3318.9	3358.2	3365.3	3361.4	3400.7	3374.3	3409.7
Net Present Value [$]	$ 4,409.63	$ 4,144.78	$ 4,100.64	$ 3,968.77	$ 3,956.42	$ 3,836.76	$ 3,703.91	$ 3,691.81	$ 3,660.32	$ 3,515.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.

LARGE Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75
Total increase in construction cost [$]	$ 15,638.21	$ 15,857.29	$ 16,188.21	$ 16,297.29	$ 16,318.78	$ 16,407.29	$ 16,488.21	$ 16,536.72	$ 16,707.29	$ 16,758.78
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 16,779.8	$ 17,014.87	$ 17,369.95	$ 17,486.99	$ 17,510.05	$ 17,605.02	$ 17,691.85	$ 17,743.9	$ 17,926.92	$ 17,982.17
Net Present Value [$]	$ 1,163.39	$ 752.04	$ 898.98	$ 636.58	$ 484.77	$ 487.64	$ 783.39	$ 306.63	$ 371.81	$ 369.12
Incremental dollars per GHG saving	$ 4.72	$ 4.7	$ 4.8	$ 4.73	$ 4.78	$ 4.77	$ 4.82	$ 4.83	$ 4.8	$ 4.81
Auxiliary Energy Required Heating [GJ/yr]	61.2	60	61.2	58.7	59.3	60	61.2	59.1	60	57.9
Annual Energy DHW [GJ/yr]	23.7	23.8	22.5	23.8	23.8	22.5	21.7	23.7	21.7	23.8
Annual Energy Space Heating [GJ/yr]	64.9	63.6	64.9	62.2	62.8	63.6	64.9	62.6	63.6	61.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.1	1.8	1.8	1.8	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	115.3	114.8	114.1	113.4	113.9	113.5	113.3	113.8	112.7	112.5
Design Heating Load [W]	12468.5	12192.3	12468.5	12056.2	12047.5	12192.3	12468.5	12078.4	12192.3	11911.4
Annual Energy Electricity [kWh/yr]	7751.4	7933.8	7751.4	7926.8	7929.6	7933.8	7751.4	7928.8	7933.8	7922.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,033.51	$ 1,059.32	$ 1,033.51	$ 1,058.33	$ 1,058.72	$ 1,059.32	$ 1,033.51	$ 1,058.61	$ 1,059.32	$ 1,057.75
Annual Energy Natural Gas [m3/yr]	2347.9	2314.8	2313.8	2278.2	2292.9	2280.7	2291.8	2288.4	2258.7	2256.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,012.8	$ 998.52	$ 998.09	$ 982.74	$ 989.08	$ 983.81	$ 988.6	$ 987.14	$ 974.32	$ 973.29
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21223	17839	21224	17857	18109	17840	21225	20971	17841	18127
Upgrade Package List	Pkg2231102031	Pkg2221101032	Pkg2231102031	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2231102031	Pkg2231101032	Pkg2221101032	Pkg2221102033
GHGI [kg/m2]	8.96	8.84	8.84	8.71	8.76	8.72	8.75	8.75	8.63	8.62
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33.3	32.6	33.3	31.9	32.2	32.6	33.3	32.1	32.6	31.5
Output: MEUI [kWh/(m2 * yr)]	48.8	48.5	48.1	47.7	48	47.8	47.6	47.9	47.3	47.3
Output: Better than ERS (%)	2080.0%	2120.0%	2160.0%	2210.0%	2180.0%	2200.0%	2220.0%	2180.0%	2260.0%	2270.0%
Output: Better than Envelope (%)	1730.0%	1890.0%	1730.0%	2070.0%	1990.0%	1890.0%	1730.0%	2010.0%	1890.0%	2180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	917	735	917	742	739	735	917	740	735	746
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 129.31	$ 103.59	$ 129.31	$ 104.58	$ 104.18	$ 103.59	$ 129.31	$ 104.3	$ 103.59	$ 105.16
Annual savings in carbon tax for electricity [$/year]	$ .46	$ .37	$ .46	$ .37	$ .37	$ .37	$ .46	$ .37	$ .37	$ .37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 129.77	$ 103.96	$ 129.77	$ 104.95	$ 104.55	$ 103.96	$ 129.77	$ 104.67	$ 103.96	$ 105.53
Annual savings in GHG from electricity savings [kg CO2e/year]	10.1	8.1	10.1	8.2	8.1	8.1	10.1	8.1	8.1	8.2
Annual savings in natural gas [m3/year]	64.23	65.47	65.5	66.83	66.28	66.74	66.32	66.45	67.56	67.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 595.13	$ 606.56	$ 606.9	$ 619.19	$ 614.12	$ 618.33	$ 614.5	$ 615.67	$ 625.92	$ 626.75
Annual savings in carbon tax for natural gas [$/year]	$ 148.54	$ 151.39	$ 151.48	$ 154.55	$ 153.28	$ 154.33	$ 153.38	$ 153.67	$ 156.23	$ 156.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 743.67	$ 757.95	$ 758.38	$ 773.74	$ 767.4	$ 772.66	$ 767.87	$ 769.34	$ 782.15	$ 783.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	3300.9	3364.3	3366.2	3434.4	3406.2	3429.6	3408.3	3414.9	3471.7	3476.3
Net Present Value [$]	$ 1,163.39	$ 752.04	$ 898.98	$ 636.58	$ 484.77	$ 487.64	$ 783.39	$ 306.63	$ 371.81	$ 369.12
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 850.	$.

LARGE Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 20,047.29	$ 20,068.78	$ 20,286.72	$ 18,788.21	$ 20,597.29	$ 20,618.78	$ 20,508.78	$ 19,007.29	$ 20,897.29	$ 20,918.78
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,510.74	$ 21,533.8	$ 21,767.65	$ 20,159.75	$ 22,100.89	$ 22,123.95	$ 22,005.92	$ 20,394.82	$ 22,422.79	$ 22,445.85
Net Present Value [$]	$ 7,585.06	$ 8,021.02	$ 7,927.47	$ 8,372.5	$ 7,892.84	$ 8,328.98	$ 8,266.38	$ 8,947.31	$ 8,037.8	$ 8,474.12
Incremental dollars per GHG saving	$ 2.85	$ 2.86	$ 2.89	$ 2.89	$ 2.91	$ 2.91	$ 2.92	$ 2.93	$ 2.94	$ 2.94
Auxiliary Energy Required Heating [GJ/yr]	60.6	61.1	61	61.1	60.6	61.1	59.8	59.9	60.6	61.1
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	23.7	12.4	12.4	13.5	23.8	11.7	11.7
Annual Energy Space Heating [GJ/yr]	24.8	25.4	24.9	25.2	24.8	25.4	25.1	24.9	24.8	25.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.1	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	70.7	71.3	70.9	80.6	69.6	70.2	71	81.1	68.9	69.5
Design Heating Load [W]	11920.9	11912.3	11943.2	12526.3	11920.9	11912.3	11776.1	12250	11920.9	11912.3
Annual Energy Electricity [kWh/yr]	15898	16059	15938	15796.2	15898.9	16060	15883.4	15933.5	15899.5	16060.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,186.25	$ 2,209.03	$ 2,191.91	$ 2,171.85	$ 2,186.38	$ 2,209.17	$ 2,198.34	$ 2,191.28	$ 2,186.46	$ 2,209.26
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	637.7	332.9	332.9	362.1	638	314.2	314.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 275.08	$ 143.6	$ 143.6	$ 156.2	$ 275.21	$ 135.53	$ 135.53
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17869	18121	20983	21232	17870	18122	18139	17848	17871	18123
Upgrade Package List	Pkg2221101033	Pkg2221102032	Pkg2231101032	Pkg2231102031	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2221101032	Pkg2221101033	Pkg2221102032
GHGI [kg/m2]	1.7	1.7	1.7	2.73	1.59	1.59	1.7	2.73	1.52	1.52
% ICC	1.8%	1.8%	1.8%	1.7%	1.8%	1.8%	1.8%	1.7%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.9	33.2	33.1	33.2	32.9	33.2	32.5	32.6	32.9	33.2
Output: MEUI [kWh/(m2 * yr)]	24.1	24.4	24.2	29.5	23.5	23.8	24.2	29.7	23.1	23.4
Output: Better than ERS (%)	5030.0%	4990.0%	5020.0%	4560.0%	5110.0%	5070.0%	5010.0%	4520.0%	5160.0%	5120.0%
Output: Better than Envelope (%)	1810.0%	1740.0%	1760.0%	1740.0%	1810.0%	1740.0%	1920.0%	1910.0%	1810.0%	1740.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7230	7390	7270	7128	7230	7392	7315	7265	7231	7392
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,019.36	$ 1,042.06	$ 1,025.	$ 1,005.01	$ 1,019.49	$ 1,042.2	$ 1,031.4	$ 1,024.36	$ 1,019.57	$ 1,042.29
Annual savings in carbon tax for electricity [$/year]	$ 3.61	$ 3.7	$ 3.63	$ 3.56	$ 3.62	$ 3.7	$ 3.66	$ 3.63	$ 3.62	$ 3.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,022.97	$ 1,045.76	$ 1,028.63	$ 1,008.57	$ 1,023.1	$ 1,045.9	$ 1,035.06	$ 1,028.	$ 1,023.19	$ 1,045.98
Annual savings in GHG from electricity savings [kg CO2e/year]	79.5	81.3	80	78.4	79.5	81.3	80.5	79.9	79.5	81.3
Annual savings in natural gas [m3/year]	138.22	138.22	138.22	127.95	139.31	139.31	138.22	127.94	140.01	140.01
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,280.64	$ 1,280.64	$ 1,280.64	$ 1,185.5	$ 1,290.72	$ 1,290.72	$ 1,280.64	$ 1,185.4	$ 1,297.17	$ 1,297.17
Annual savings in carbon tax for natural gas [$/year]	$ 319.64	$ 319.64	$ 319.64	$ 295.89	$ 322.16	$ 322.16	$ 319.64	$ 295.87	$ 323.77	$ 323.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,600.28	$ 1,600.28	$ 1,600.28	$ 1,481.39	$ 1,612.87	$ 1,612.87	$ 1,600.28	$ 1,481.26	$ 1,620.94	$ 1,620.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	7103.1	7103.1	7103.1	6575.4	7159	7159	7103.1	6574.9	7194.8	7194.8
Net Present Value [$]	$ 7,585.06	$ 8,021.02	$ 7,927.47	$ 8,372.5	$ 7,892.84	$ 8,328.98	$ 8,266.38	$ 8,947.31	$ 8,037.8	$ 8,474.12
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

LARGE Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,897.29	$ 16,918.78	$ 17,358.78	$ 17,447.29	$ 17,136.72	$ 17,576.72	$ 17,747.29	$ 17,468.78	$ 17,908.78	$ 17,598.21
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,130.79	$ 18,153.85	$ 18,625.97	$ 18,720.94	$ 18,387.7	$ 18,859.82	$ 19,042.84	$ 18,744.	$ 19,216.12	$ 18,882.88
Net Present Value [$]	$ 1,852.27	$ 1,699.49	$ 1,586.69	$ 1,544.19	$ 1,518.74	$ 1,404.98	$ 1,399.6	$ 1,391.41	$ 1,278.61	$ 1,252.37
Incremental dollars per GHG saving	$ 4.37	$ 4.41	$ 4.44	$ 4.45	$ 4.46	$ 4.49	$ 4.49	$ 4.49	$ 4.52	$ 4.53
Auxiliary Energy Required Heating [GJ/yr]	60.7	61.3	59.9	60.7	61.1	59.8	60.7	61.3	59.9	60.3
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	13.5	11.7	12.4	12.4	13.5
Annual Energy Space Heating [GJ/yr]	64.3	64.9	63.5	64.3	64.7	63.3	64.3	64.9	63.5	63.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	105.2	105.8	104.4	104.1	105.6	104.2	103.5	104.7	103.3	104.8
Design Heating Load [W]	11864	11855.4	11719.2	11864	11886.3	11750.1	11864	11855.4	11719.2	11741.5
Annual Energy Electricity [kWh/yr]	7937.4	7940.2	7933.2	7937.4	7939.4	7932.4	7937.5	7940.2	7933.2	7935.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,059.83	$ 1,060.22	$ 1,059.23	$ 1,059.83	$ 1,060.11	$ 1,059.12	$ 1,059.84	$ 1,060.22	$ 1,059.23	$ 1,059.52
Annual Energy Natural Gas [m3/yr]	2058.2	2073	2036.1	2029.3	2068.8	2032	2010.7	2044.1	2007.2	2046.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 887.84	$ 894.22	$ 878.3	$ 875.37	$ 892.41	$ 876.53	$ 867.35	$ 881.75	$ 865.84	$ 882.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17860	18112	18130	17861	20974	20992	17862	18113	18131	21244
Upgrade Package List	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2221101033	Pkg2231101032	Pkg2231101033	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2231102032
GHGI [kg/m2]	7.88	7.94	7.8	7.77	7.92	7.78	7.7	7.83	7.69	7.84
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33	33.3	32.6	33	33.2	32.5	33	33.3	32.6	32.8
Output: MEUI [kWh/(m2 * yr)]	43.3	43.6	42.8	42.7	43.5	42.7	42.3	43	42.2	43
Output: Better than ERS (%)	2480.0%	2440.0%	2540.0%	2560.0%	2450.0%	2550.0%	2600.0%	2520.0%	2620.0%	2510.0%
Output: Better than Envelope (%)	1800.0%	1720.0%	1910.0%	1800.0%	1740.0%	1920.0%	1800.0%	1720.0%	1910.0%	1850.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	731	728	735	731	729	736	731	728	735	733
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 103.09	$ 102.69	$ 103.68	$ 103.09	$ 102.8	$ 103.79	$ 103.07	$ 102.69	$ 103.68	$ 103.4
Annual savings in carbon tax for electricity [$/year]	$ .37	$ .36	$ .37	$ .37	$ .36	$ .37	$ .37	$ .36	$ .37	$ .37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 103.45	$ 103.05	$ 104.04	$ 103.45	$ 103.17	$ 104.16	$ 103.44	$ 103.05	$ 104.04	$ 103.76
Annual savings in GHG from electricity savings [kg CO2e/year]	8	8	8.1	8	8	8.1	8	8	8.1	8.1
Annual savings in natural gas [m3/year]	75.03	74.48	75.85	76.11	74.63	76	76.8	75.55	76.93	75.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 695.14	$ 690.03	$ 702.77	$ 705.11	$ 691.48	$ 704.18	$ 711.53	$ 700.	$ 712.74	$ 699.07
Annual savings in carbon tax for natural gas [$/year]	$ 173.5	$ 172.23	$ 175.41	$ 175.99	$ 172.59	$ 175.76	$ 177.6	$ 174.72	$ 177.9	$ 174.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 868.64	$ 862.26	$ 878.17	$ 881.11	$ 864.07	$ 879.94	$ 889.13	$ 874.72	$ 890.64	$ 873.56
Annual savings in GHG from natural gas savings [kg CO2e/year]	3855.6	3827.3	3897.9	3911	3835.3	3905.8	3946.6	3882.6	3953.3	3877.4
Net Present Value [$]	$ 1,852.27	$ 1,699.49	$ 1,586.69	$ 1,544.19	$ 1,518.74	$ 1,404.98	$ 1,399.6	$ 1,391.41	$ 1,278.61	$ 1,252.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	8.77	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$ 550.	$.

LARGE Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 39,644.57	$ 39,661.24	$ 39,824.	$ 39,955.22	$ 40,194.57	$ 40,211.24	$ 40,283.56	$ 40,324.	$ 40,374.	$ 40,462.99
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 42,538.62	$ 42,556.51	$ 42,731.15	$ 42,871.95	$ 43,128.77	$ 43,146.66	$ 43,224.26	$ 43,267.65	$ 43,321.3	$ 43,416.79
Net Present Value [$]	$ 23,229.23	$ 23,454.05	$ 23,389.25	$ 15,507.74	$ 23,492.9	$ 23,717.48	$ 23,868.22	$ 23,675.62	$ 23,653.66	$ 24,028.24
Incremental dollars per GHG saving	$ 6.08	$ 6.08	$ 6.11	$ 7.83	$ 6.1	$ 6.11	$ 6.18	$ 6.18	$ 6.13	$ 6.2
Auxiliary Energy Required Heating [GJ/yr]	39.3	39.7	39.2	39.3	39.3	39.7	39.3	38.4	39.2	39.2
Annual Energy DHW [GJ/yr]	23.8	23.8	23.8	11.7	22.5	22.5	23.8	23.8	22.5	23.8
Annual Energy Space Heating [GJ/yr]	16	16.3	15.9	41.7	16	16.3	16	15.6	15.9	15.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	72.2	72.5	72.2	80.8	71	71.3	72.2	71.9	70.9	72.2
Design Heating Load [W]	9242.4	9547.2	9157.7	8816.7	9242.4	9547.2	9242.4	9128.5	9157.7	9157.7
Annual Energy Electricity [kWh/yr]	13464.2	13545.3	13457.6	7824.3	13464.2	13545.3	13464.2	13374.3	13457.6	13457.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,841.87	$ 1,853.34	$ 1,840.94	$ 1,043.82	$ 1,841.87	$ 1,853.34	$ 1,841.87	$ 1,829.15	$ 1,840.94	$ 1,840.94
Annual Energy Natural Gas [m3/yr]	638.2	638.1	637.9	1412.7	604	603.9	638.2	638	603.8	637.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.3	$ 275.25	$ 275.17	$ 609.39	$ 260.54	$ 260.5	$ 275.3	$ 275.21	$ 260.46	$ 275.17
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51076	45946	51634	51792	51077	45947	51364	51652	51635	51922
Upgrade Package List	Pkg4321302054	Pkg3331203054	Pkg4331302053	Pkg4331303054	Pkg4321302054	Pkg3331203054	Pkg4321402054	Pkg4331302054	Pkg4331302053	Pkg4331402053
GHGI [kg/m2]	2.68	2.68	2.68	5.46	2.55	2.55	2.68	2.68	2.55	2.68
% ICC	3.5%	3.5%	3.5%	3.5%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.4	21.6	21.3	21.4	21.4	21.6	21.4	20.9	21.3	21.3
Output: MEUI [kWh/(m2 * yr)]	24.9	25.1	24.9	30	24.2	24.4	24.9	24.7	24.2	24.9
Output: Better than ERS (%)	5120.0%	5100.0%	5120.0%	4220.0%	5210.0%	5190.0%	5120.0%	5150.0%	5210.0%	5120.0%
Output: Better than Envelope (%)	4690.0%	4640.0%	4700.0%	4690.0%	4690.0%	4640.0%	4690.0%	4810.0%	4700.0%	4700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4796	4877	4789	844	4796	4877	4796	4706	4789	4789
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 676.19	$ 687.63	$ 675.26	$ 119.03	$ 676.19	$ 687.63	$ 676.19	$ 663.52	$ 675.26	$ 675.26
Annual savings in carbon tax for electricity [$/year]	$ 2.4	$ 2.44	$ 2.39	$ .42	$ 2.4	$ 2.44	$ 2.4	$ 2.35	$ 2.39	$ 2.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 678.59	$ 690.07	$ 677.66	$ 119.45	$ 678.59	$ 690.07	$ 678.59	$ 665.87	$ 677.66	$ 677.66
Annual savings in GHG from electricity savings [kg CO2e/year]	52.8	53.6	52.7	9.3	52.8	53.6	52.8	51.8	52.7	52.7
Annual savings in natural gas [m3/year]	127.94	127.94	127.95	99.08	129.21	129.21	127.94	127.94	129.22	127.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,185.33	$ 1,185.36	$ 1,185.43	$ 917.97	$ 1,197.13	$ 1,197.17	$ 1,185.33	$ 1,185.4	$ 1,197.2	$ 1,185.43
Annual savings in carbon tax for natural gas [$/year]	$ 295.85	$ 295.86	$ 295.88	$ 229.12	$ 298.8	$ 298.81	$ 295.85	$ 295.87	$ 298.82	$ 295.88
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,481.18	$ 1,481.22	$ 1,481.31	$ 1,147.09	$ 1,495.93	$ 1,495.97	$ 1,481.18	$ 1,481.26	$ 1,496.02	$ 1,481.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	6574.5	6574.7	6575.1	5091.6	6640	6640.2	6574.5	6574.9	6640.4	6575.1
Net Present Value [$]	$ 23,229.23	$ 23,454.05	$ 23,389.25	$ 15,507.74	$ 23,492.9	$ 23,717.48	$ 23,868.22	$ 23,675.62	$ 23,653.66	$ 24,028.24
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	14.09	10.47	14.09	10.47	14.09	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 3,141.69	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 3,141.69	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	NBC gas furnace	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$ 550.	$ 550.	$.	$.	$ 550.	$.

LARGE Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 42,255.22	$ 42,805.22	$ 42,525.67	$ 43,105.22	$ 43,075.67	$ 43,375.67	$ 39,644.57	$ 39,661.24	$ 42,894.21	$ 40,194.57
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 45,339.85	$ 45,930.	$ 45,630.04	$ 46,251.9	$ 46,220.19	$ 46,542.09	$ 42,538.62	$ 42,556.51	$ 46,025.49	$ 43,128.77
Net Present Value [$]	$ 23,741.94	$ 24,049.54	$ 24,091.99	$ 24,194.5	$ 24,399.42	$ 24,544.55	$ 23,229.23	$ 23,454.05	$ 24,380.93	$ 23,492.9
Incremental dollars per GHG saving	$ 5.99	$ 6.02	$ 6.03	$ 6.04	$ 6.06	$ 6.07	$ 6.08	$ 6.08	$ 6.09	$ 6.1
Auxiliary Energy Required Heating [GJ/yr]	39.2	39.2	39.7	39.2	39.7	39.7	39.3	39.7	39.2	39.3
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	12.4	11.7	23.8	23.8	13.5	22.5
Annual Energy Space Heating [GJ/yr]	16.3	16.3	16.4	16.3	16.4	16.4	16	16.3	16.3	16
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	62.3	61.2	62.4	60.5	61.3	60.6	72.2	72.5	62.3	71
Design Heating Load [W]	8861.1	8861.1	8866.8	8861.1	8866.8	8866.8	9242.4	9547.2	8861.1	9242.4
Annual Energy Electricity [kWh/yr]	13547.6	13548.4	13578.5	13549	13579.3	13579.9	13464.2	13545.3	13547.6	13464.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,853.67	$ 1,853.78	$ 1,858.04	$ 1,853.87	$ 1,858.16	$ 1,858.24	$ 1,841.87	$ 1,853.34	$ 1,853.67	$ 1,841.87
Annual Energy Natural Gas [m3/yr]	362.1	332.9	362.1	314.2	332.9	314.2	638.2	638.1	362.1	604
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.6	$ 156.2	$ 135.53	$ 143.6	$ 135.53	$ 275.3	$ 275.25	$ 156.2	$ 260.54
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51799	51800	52231	51801	52232	52233	51076	45946	52087	51077
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4341302054	Pkg4331303054	Pkg4341302054	Pkg4341302054	Pkg4321302054	Pkg3331203054	Pkg4331403054	Pkg4321302054
GHGI [kg/m2]	1.65	1.54	1.65	1.47	1.54	1.47	2.68	2.68	1.65	2.55
% ICC	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.5%	3.5%	3.8%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.3	21.3	21.6	21.3	21.6	21.6	21.4	21.6	21.3	21.4
Output: MEUI [kWh/(m2 * yr)]	19.5	18.9	19.5	18.5	19	18.6	24.9	25.1	19.5	24.2
Output: Better than ERS (%)	5620.0%	5700.0%	5610.0%	5750.0%	5690.0%	5740.0%	5120.0%	5100.0%	5620.0%	5210.0%
Output: Better than Envelope (%)	4700.0%	4700.0%	4640.0%	4700.0%	4640.0%	4640.0%	4690.0%	4640.0%	4700.0%	4690.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4879	4880	4910	4880	4911	4911	4796	4877	4879	4796
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 687.95	$ 688.07	$ 692.31	$ 688.15	$ 692.42	$ 692.51	$ 676.19	$ 687.63	$ 687.95	$ 676.19
Annual savings in carbon tax for electricity [$/year]	$ 2.44	$ 2.44	$ 2.46	$ 2.44	$ 2.46	$ 2.46	$ 2.4	$ 2.44	$ 2.44	$ 2.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 690.39	$ 690.51	$ 694.76	$ 690.59	$ 694.88	$ 694.96	$ 678.59	$ 690.07	$ 690.39	$ 678.59
Annual savings in GHG from electricity savings [kg CO2e/year]	53.7	53.7	54	53.7	54	54	52.8	53.6	53.7	52.8
Annual savings in natural gas [m3/year]	138.22	139.31	138.22	140.01	139.31	140.01	127.94	127.94	138.22	129.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,280.64	$ 1,290.72	$ 1,280.64	$ 1,297.17	$ 1,290.72	$ 1,297.17	$ 1,185.33	$ 1,185.36	$ 1,280.64	$ 1,197.13
Annual savings in carbon tax for natural gas [$/year]	$ 319.64	$ 322.16	$ 319.64	$ 323.77	$ 322.16	$ 323.77	$ 295.85	$ 295.86	$ 319.64	$ 298.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,600.28	$ 1,612.87	$ 1,600.28	$ 1,620.94	$ 1,612.87	$ 1,620.94	$ 1,481.18	$ 1,481.22	$ 1,600.28	$ 1,495.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	7103.1	7159	7103.1	7194.8	7159	7194.8	6574.5	6574.7	7103.1	6640
Net Present Value [$]	$ 23,741.94	$ 24,049.54	$ 24,091.99	$ 24,194.5	$ 24,399.42	$ 24,544.55	$ 23,229.23	$ 23,454.05	$ 24,380.93	$ 23,492.9
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.47	14.09	10.47	10.47	10.47	14.09	14.09	10.47
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 2,775.65	$ 2,775.65	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 3,141.69	$ 4,774.66	$ 4,135.67
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 39,955.22	$ 40,594.21	$ 41,256.89	$ 41,556.89	$ 41,895.88	$ 42,195.88	$ 39,644.57	$ 39,824.	$ 39,661.24	$ 40,194.57
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 42,871.95	$ 43,557.59	$ 44,268.64	$ 44,590.54	$ 44,954.28	$ 45,276.18	$ 42,538.62	$ 42,731.15	$ 42,556.51	$ 43,128.77
Net Present Value [$]	$ 15,507.74	$ 16,146.73	$ 16,811.74	$ 16,955.96	$ 17,450.73	$ 17,594.95	$ 23,229.23	$ 23,389.25	$ 23,454.05	$ 23,492.9
Incremental dollars per GHG saving	$ 7.83	$ 7.96	$ 8.09	$ 8.09	$ 8.22	$ 8.22	$ 6.08	$ 6.11	$ 6.08	$ 6.1
Auxiliary Energy Required Heating [GJ/yr]	39.3	39.3	38.7	38.7	38.7	38.7	39.3	39.2	39.7	39.3
Annual Energy DHW [GJ/yr]	11.7	11.7	12.4	11.7	12.4	11.7	23.8	23.8	23.8	22.5
Annual Energy Space Heating [GJ/yr]	41.7	41.7	41	41	41	41	16	15.9	16.3	16
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	80.8	80.8	80.8	80.1	80.8	80.1	72.2	72.2	72.5	71
Design Heating Load [W]	8816.7	8816.7	8737.4	8737.4	8737.4	8737.4	9242.4	9157.7	9547.2	9242.4
Annual Energy Electricity [kWh/yr]	7824.3	7824.3	7821	7821	7821	7821	13464.2	13457.6	13545.3	13464.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,043.82	$ 1,043.82	$ 1,043.36	$ 1,043.36	$ 1,043.36	$ 1,043.36	$ 1,841.87	$ 1,840.94	$ 1,853.34	$ 1,841.87
Annual Energy Natural Gas [m3/yr]	1412.7	1412.7	1414	1395.4	1414	1395.4	638.2	637.9	638.1	604
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 609.39	$ 609.39	$ 609.95	$ 601.93	$ 609.95	$ 601.93	$ 275.3	$ 275.17	$ 275.25	$ 260.54
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51792	52080	52367	52368	52655	52656	51076	51634	45946	51077
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4321302054	Pkg4331302053	Pkg3331203054	Pkg4321302054
GHGI [kg/m2]	5.46	5.46	5.47	5.4	5.47	5.4	2.68	2.68	2.68	2.55
% ICC	3.5%	3.6%	3.7%	3.7%	3.7%	3.7%	3.5%	3.5%	3.5%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.4	21.4	21	21	21	21	21.4	21.3	21.6	21.4
Output: MEUI [kWh/(m2 * yr)]	30	30	30	29.6	30	29.6	24.9	24.9	25.1	24.2
Output: Better than ERS (%)	4220.0%	4220.0%	4220.0%	4270.0%	4220.0%	4270.0%	5120.0%	5120.0%	5100.0%	5210.0%
Output: Better than Envelope (%)	4690.0%	4690.0%	4770.0%	4770.0%	4770.0%	4770.0%	4690.0%	4700.0%	4640.0%	4690.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	844	844	848	848	848	848	4796	4789	4877	4796
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 119.03	$ 119.03	$ 119.5	$ 119.5	$ 119.5	$ 119.5	$ 676.19	$ 675.26	$ 687.63	$ 676.19
Annual savings in carbon tax for electricity [$/year]	$ .42	$ .42	$ .42	$ .42	$ .42	$ .42	$ 2.4	$ 2.39	$ 2.44	$ 2.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 119.45	$ 119.45	$ 119.92	$ 119.92	$ 119.92	$ 119.92	$ 678.59	$ 677.66	$ 690.07	$ 678.59
Annual savings in GHG from electricity savings [kg CO2e/year]	9.3	9.3	9.3	9.3	9.3	9.3	52.8	52.7	53.6	52.8
Annual savings in natural gas [m3/year]	99.08	99.08	99.03	99.72	99.03	99.72	127.94	127.95	127.94	129.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 917.97	$ 917.97	$ 917.52	$ 923.94	$ 917.52	$ 923.94	$ 1,185.33	$ 1,185.43	$ 1,185.36	$ 1,197.13
Annual savings in carbon tax for natural gas [$/year]	$ 229.12	$ 229.12	$ 229.01	$ 230.61	$ 229.01	$ 230.61	$ 295.85	$ 295.88	$ 295.86	$ 298.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,147.09	$ 1,147.09	$ 1,146.53	$ 1,154.55	$ 1,146.53	$ 1,154.55	$ 1,481.18	$ 1,481.31	$ 1,481.22	$ 1,495.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	5091.6	5091.6	5089.1	5124.7	5089.1	5124.7	6574.5	6575.1	6574.7	6640
Net Present Value [$]	$ 15,507.74	$ 16,146.73	$ 16,811.74	$ 16,955.96	$ 17,450.73	$ 17,594.95	$ 23,229.23	$ 23,389.25	$ 23,454.05	$ 23,492.9
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	10.47	10.47	14.09	10.47
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 3,141.69	$ 4,135.67
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 11,464.3	$ 11,502.81	$ 11,682.24	$ 11,761.47	$ 11,964.3	$ 12,014.3	$ 12,052.81	$ 12,102.81	$ 12,143.73	$ 12,182.24
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 12,908.8	$ 12,952.16	$ 13,154.2	$ 13,243.42	$ 13,471.8	$ 13,528.1	$ 13,571.46	$ 13,627.76	$ 13,673.84	$ 13,717.2
Net Present Value [$]	$ 6,746.93	$ 8,885.16	$ 6,571.64	$ 6,569.95	$ 8,677.22	$ 6,514.31	$ 8,652.54	$ 10,115.17	$ 6,363.52	$ 8,501.75
Incremental dollars per GHG saving	$ 3.17	$ 2.82	$ 3.22	$ 3.23	$ 2.89	$ 3.26	$ 2.9	$ 2.68	$ 3.3	$ 2.94
Auxiliary Energy Required Heating [GJ/yr]	105.8	97	105.6	105.3	96	105.8	97	99.1	104.6	95.8
Annual Energy DHW [GJ/yr]	24.7	24.7	24.7	24.7	24.7	23.3	23.3	14.3	24.7	24.7
Annual Energy Space Heating [GJ/yr]	112.1	102.8	111.9	111.6	101.7	112.1	102.8	105	110.8	101.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	163.5	154.2	163.3	163	153.1	162.1	152.8	146	162.3	152.9
Design Heating Load [W]	19577.4	17823.2	19631.8	17823.2	17635.4	19577.4	17823.2	17533.6	19444	17689.9
Annual Energy Electricity [kWh/yr]	7988.7	7942.2	7987.8	7986.2	7936.8	7988.7	7942.2	7953.4	7982.4	7935.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,067.09	$ 1,060.51	$ 1,066.96	$ 1,066.73	$ 1,059.74	$ 1,067.09	$ 1,060.51	$ 1,062.09	$ 1,066.19	$ 1,059.61
Annual Energy Natural Gas [m3/yr]	3618.9	3373.3	3614.1	3605.3	3344.7	3581	3335.4	3151.4	3585.5	3339.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,561.07	$ 1,455.12	$ 1,559.	$ 1,555.2	$ 1,442.79	$ 1,544.72	$ 1,438.78	$ 1,359.4	$ 1,546.66	$ 1,440.72
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1999	11449	3349	11395	11719	2000	11450	11452	3619	13069
Upgrade Package List	Pkg1121102031	Pkg2121101031	Pkg1131101031	Pkg2121101021	Pkg2121102031	Pkg1121102031	Pkg2121101031	Pkg2121101031	Pkg1131102031	Pkg2131101031
GHGI [kg/m2]	13.73	12.81	13.71	13.68	12.7	13.59	12.67	11.98	13.61	12.69
% ICC	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.5	52.7	57.4	57.3	52.2	57.5	52.7	53.9	56.9	52.1
Output: MEUI [kWh/(m2 * yr)]	75	69.9	74.9	74.7	69.3	74.2	69.1	65.4	74.3	69.2
Output: Better than ERS (%)	1230.0%	1730.0%	1240.0%	1260.0%	1790.0%	1300.0%	1800.0%	1920.0%	1290.0%	1800.0%
Output: Better than Envelope (%)	780.0%	110.0%	760.0%	730.0%	210.0%	780.0%	110.0%	100.0%	660.0%	230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	950	997	951	953	1002	950	997	986	956	1003
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 133.98	$ 140.53	$ 134.11	$ 134.33	$ 141.3	$ 133.98	$ 140.53	$ 138.96	$ 134.87	$ 141.42
Annual savings in carbon tax for electricity [$/year]	$ .48	$ .5	$ .48	$ .48	$ .5	$ .48	$ .5	$ .49	$ .48	$ .5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 134.45	$ 141.03	$ 134.58	$ 134.81	$ 141.8	$ 134.45	$ 141.03	$ 139.45	$ 135.34	$ 141.92
Annual savings in GHG from electricity savings [kg CO2e/year]	10.5	11	10.5	10.5	11	10.5	11	10.8	10.5	11
Annual savings in natural gas [m3/year]	70.13	79.28	70.3	70.63	80.34	71.54	80.69	87.54	71.37	80.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 649.71	$ 734.49	$ 651.37	$ 654.4	$ 744.36	$ 662.79	$ 747.57	$ 811.09	$ 661.24	$ 746.02
Annual savings in carbon tax for natural gas [$/year]	$ 162.16	$ 183.33	$ 162.58	$ 163.34	$ 185.79	$ 165.43	$ 186.59	$ 202.44	$ 165.04	$ 186.2
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 811.87	$ 917.82	$ 813.94	$ 817.74	$ 930.15	$ 828.22	$ 934.16	$ 1,013.54	$ 826.28	$ 932.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	3603.6	4073.9	3612.8	3629.7	4128.7	3676.2	4146.5	4498.8	3667.6	4137.8
Net Present Value [$]	$ 6,746.93	$ 8,885.16	$ 6,571.64	$ 6,569.95	$ 8,677.22	$ 6,514.31	$ 8,652.54	$ 10,115.17	$ 6,363.52	$ 8,501.75
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.

LARGE Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,026.81	$ 14,152.81	$ 15,252.81	$ 16,488.3	$ 16,576.81	$ 14,702.81	$ 14,614.3	$ 14,652.81	$ 16,706.24	$ 15,002.81
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,046.19	$ 15,936.06	$ 17,174.66	$ 18,565.83	$ 18,665.49	$ 16,555.36	$ 16,455.7	$ 16,499.06	$ 18,811.23	$ 16,893.16
Net Present Value [$]	$ 3,065.23	$ 2,080.27	$ 1,602.99	$ 3,269.46	$ 3,097.06	$ 2,312.89	$ 2,278.1	$ 276.09	$ 3,432.63	$ 2,406.64
Incremental dollars per GHG saving	$ 1.54	$ 1.55	$ 1.57	$ 1.59	$ 1.6	$ 1.6	$ 1.6	$ 1.6	$ 1.61	$ 1.62
Auxiliary Energy Required Heating [GJ/yr]	103.5	106.6	98.8	102.5	103.2	106.6	105.5	96.8	102.3	106.6
Annual Energy DHW [GJ/yr]	8.2	24.7	14.3	8.2	7.6	23.3	24.7	24.7	8.2	22.4
Annual Energy Space Heating [GJ/yr]	40.7	42.4	39	40.3	40.6	42.4	42	38.4	40.2	42.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	78.5	96.7	82.8	78.1	77.8	95.3	96.3	92.7	78.1	94.4
Design Heating Load [W]	17899.7	19845.1	17609.2	17711.9	17899.7	19845.1	19657.3	17899.7	17766.3	19845.1
Annual Energy Electricity [kWh/yr]	21802.3	19987.2	19044.5	21702.4	21601	19987.2	19884.5	18877.7	21681.1	19987.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,021.71	$ 2,764.87	$ 2,631.48	$ 3,007.57	$ 2,993.23	$ 2,764.87	$ 2,750.34	$ 2,607.88	$ 3,004.56	$ 2,764.87
Annual Energy Natural Gas [m3/yr]	0	664	382.7	0	0	626.1	664.1	664	0	601.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 286.43	$ 165.08	$.	$.	$ 270.08	$ 286.47	$ 286.43	$.	$ 259.47
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	1738	11461	11734	11465	1739	2008	11458	13084	1740
Upgrade Package List	Pkg2121101031	Pkg1121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg2133101031	Pkg1121101031
GHGI [kg/m2]	0.47	2.92	1.84	0.47	0.46	2.78	2.92	2.89	0.47	2.68
% ICC	1.4%	1.3%	1.4%	1.5%	1.5%	1.3%	1.3%	1.3%	1.5%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	56.3	57.9	53.7	55.7	56.1	57.9	57.4	52.6	55.6	57.9
Output: MEUI [kWh/(m2 * yr)]	28.5	38.4	30.8	28.3	28.1	37.6	38.2	36.2	28.3	37.1
Output: Better than ERS (%)	5610.0%	4750.0%	5360.0%	5630.0%	5650.0%	4830.0%	4770.0%	4970.0%	5630.0%	4880.0%
Output: Better than Envelope (%)	550.0%	870.0%	70.0%	450.0%	520.0%	870.0%	750.0%	130.0%	430.0%	870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12863	11048	10106	12764	12662	11048	10946	9939	12742	11048
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,813.74	$ 1,557.81	$ 1,424.89	$ 1,799.65	$ 1,785.36	$ 1,557.81	$ 1,543.33	$ 1,401.37	$ 1,796.65	$ 1,557.81
Annual savings in carbon tax for electricity [$/year]	$ 6.43	$ 5.52	$ 5.05	$ 6.38	$ 6.33	$ 5.52	$ 5.47	$ 4.97	$ 6.37	$ 5.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,820.17	$ 1,563.33	$ 1,429.94	$ 1,806.04	$ 1,791.69	$ 1,563.33	$ 1,548.8	$ 1,406.34	$ 1,803.02	$ 1,563.33
Annual savings in GHG from electricity savings [kg CO2e/year]	141.5	121.5	111.2	140.4	139.3	121.5	120.4	109.3	140.2	121.5
Annual savings in natural gas [m3/year]	204.96	180.22	190.7	204.96	204.96	181.63	180.22	180.22	204.96	182.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,898.97	$ 1,669.75	$ 1,766.86	$ 1,898.97	$ 1,898.97	$ 1,682.83	$ 1,669.72	$ 1,669.75	$ 1,898.97	$ 1,691.33
Annual savings in carbon tax for natural gas [$/year]	$ 473.97	$ 416.76	$ 441.	$ 473.97	$ 473.97	$ 420.03	$ 416.75	$ 416.76	$ 473.97	$ 422.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,372.94	$ 2,086.51	$ 2,207.86	$ 2,372.94	$ 2,372.94	$ 2,102.86	$ 2,086.47	$ 2,086.51	$ 2,372.94	$ 2,113.47
Annual savings in GHG from natural gas savings [kg CO2e/year]	10532.7	9261.4	9800	10532.7	10532.7	9333.9	9261.2	9261.4	10532.7	9381
Net Present Value [$]	$ 3,065.23	$ 2,080.27	$ 1,602.99	$ 3,269.46	$ 3,097.06	$ 2,312.89	$ 2,278.1	$ 276.09	$ 3,432.63	$ 2,406.64
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$.	$ 600.	$ 1,374.	$ 1,374.	$.	$.	$.	$ 1,374.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$ 850.

LARGE Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,102.81	$ 12,564.3	$ 12,652.81	$ 12,782.24	$ 12,952.81	$ 13,114.3	$ 13,243.73	$ 13,414.3	$ 13,332.24	$ 15,097.29
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,627.76	$ 14,147.4	$ 14,247.06	$ 14,392.8	$ 14,584.86	$ 14,766.7	$ 14,912.44	$ 15,104.5	$ 15,012.1	$ 16,999.55
Net Present Value [$]	$ 10,115.17	$ 9,908.2	$ 9,833.29	$ 9,729.15	$ 9,707.14	$ 9,625.9	$ 9,521.21	$ 9,500.36	$ 9,448.	$ 9,366.78
Incremental dollars per GHG saving	$ 2.68	$ 2.75	$ 2.77	$ 2.8	$ 2.81	$ 2.84	$ 2.86	$ 2.88	$ 2.88	$ 3.02
Auxiliary Energy Required Heating [GJ/yr]	99.1	98.1	99.1	97.9	99.1	98.1	96.9	98.1	97.9	90
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	14.3	12.3	13	14.3
Annual Energy Space Heating [GJ/yr]	105	103.9	105	103.7	105	103.9	102.6	103.9	103.7	95.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	146	144.9	144.8	144.7	144	143.7	143.6	142.9	143.5	136.4
Design Heating Load [W]	17533.6	17345.8	17533.6	17400.3	17533.6	17345.8	17212.4	17345.8	17400.3	16449.2
Annual Energy Electricity [kWh/yr]	7953.4	7947.9	7953.4	7947.1	7953.5	7948	7941.7	7948	7947.1	7905.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,062.09	$ 1,061.31	$ 1,062.09	$ 1,061.2	$ 1,062.11	$ 1,061.33	$ 1,060.44	$ 1,061.33	$ 1,061.2	$ 1,055.3
Annual Energy Natural Gas [m3/yr]	3151.4	3122.7	3119.4	3118.3	3098.6	3090.7	3089.7	3069.9	3086.2	2898
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,359.4	$ 1,347.02	$ 1,345.6	$ 1,345.13	$ 1,336.63	$ 1,333.22	$ 1,332.79	$ 1,324.25	$ 1,331.28	$ 1,250.1
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	13072	11454	11723	13342	11724	13073	17824
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2122102031	Pkg2131102031	Pkg2122102031	Pkg2131101031	Pkg2221101031
GHGI [kg/m2]	11.98	11.87	11.86	11.86	11.78	11.75	11.75	11.67	11.74	11.03
% ICC	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53.9	53.3	53.9	53.2	53.9	53.3	52.7	53.3	53.2	49
Output: MEUI [kWh/(m2 * yr)]	65.4	64.8	64.8	64.7	64.4	64.2	64.2	63.8	64.1	60.2
Output: Better than ERS (%)	1920.0%	1990.0%	1990.0%	2000.0%	2040.0%	2050.0%	2060.0%	2100.0%	2060.0%	2460.0%
Output: Better than Envelope (%)	100.0%	0.0%	100.0%	20.0%	100.0%	0.0%	120.0%	0.0%	20.0%	830.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	986	991	986	992	985	991	997	991	992	1034
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 138.96	$ 139.73	$ 138.96	$ 139.84	$ 138.94	$ 139.72	$ 140.61	$ 139.72	$ 139.84	$ 145.72
Annual savings in carbon tax for electricity [$/year]	$ .49	$ .5	$ .49	$ .5	$ .49	$ .5	$ .5	$ .5	$ .5	$ .52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 139.45	$ 140.23	$ 139.45	$ 140.34	$ 139.43	$ 140.21	$ 141.1	$ 140.21	$ 140.34	$ 146.24
Annual savings in GHG from electricity savings [kg CO2e/year]	10.8	10.9	10.8	10.9	10.8	10.9	11	10.9	10.9	11.4
Annual savings in natural gas [m3/year]	87.54	88.61	88.74	88.78	89.51	89.81	89.84	90.58	89.97	96.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 811.09	$ 821.	$ 822.14	$ 822.52	$ 829.32	$ 832.04	$ 832.39	$ 839.23	$ 833.6	$ 898.57
Annual savings in carbon tax for natural gas [$/year]	$ 202.44	$ 204.92	$ 205.2	$ 205.3	$ 206.99	$ 207.67	$ 207.76	$ 209.47	$ 208.06	$ 224.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,013.54	$ 1,025.92	$ 1,027.34	$ 1,027.81	$ 1,036.31	$ 1,039.72	$ 1,040.15	$ 1,048.69	$ 1,041.66	$ 1,122.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	4498.8	4553.7	4560	4562.1	4599.9	4615	4616.9	4654.8	4623.6	4983.9
Net Present Value [$]	$ 10,115.17	$ 9,908.2	$ 9,833.29	$ 9,729.15	$ 9,707.14	$ 9,625.9	$ 9,521.21	$ 9,500.36	$ 9,448.	$ 9,366.78
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.

LARGE Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,888.21	$ 19,007.29	$ 19,447.29	$ 19,468.78	$ 19,557.29	$ 19,686.72	$ 19,857.29	$ 19,908.78	$ 19,997.29	$ 20,018.78
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 21,268.12	$ 21,402.21	$ 21,897.65	$ 21,921.85	$ 22,021.51	$ 22,167.25	$ 22,359.31	$ 22,417.29	$ 22,516.95	$ 22,541.15
Net Present Value [$]	$ 7,499.18	$ 1,117.64	$ 1,090.1	$ 1,321.38	$ 1,350.26	$ 1,492.83	$ 1,444.26	$ 1,294.69	$ 1,322.48	$ 1,553.76
Incremental dollars per GHG saving	$ 3.42	$ 2.07	$ 2.12	$ 2.12	$ 2.12	$ 2.15	$ 2.14	$ 2.17	$ 2.17	$ 2.17
Auxiliary Energy Required Heating [GJ/yr]	82.1	83.9	82.1	82.9	83.9	82.8	83.9	81.1	82.1	82.9
Annual Energy DHW [GJ/yr]	12.3	24.7	24.7	24.7	23.3	24.7	22.4	24.7	23.3	23.3
Annual Energy Space Heating [GJ/yr]	87	33.5	32.8	33.1	33.5	33	33.5	32.5	32.8	33.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	126.7	88.6	87.9	88.2	87.1	88.1	86.2	87.5	86.5	86.8
Design Heating Load [W]	15257.4	16121.3	15944.7	15933.5	16121.3	15987.9	16121.3	15756.8	15944.7	15933.5
Annual Energy Electricity [kWh/yr]	8050.8	17726.7	17544.7	17626.2	17726.7	17609.5	17726.7	17444.9	17544.7	17626.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,075.87	$ 2,445.01	$ 2,419.26	$ 2,430.79	$ 2,445.01	$ 2,428.43	$ 2,445.01	$ 2,405.14	$ 2,419.26	$ 2,430.79
Annual Energy Natural Gas [m3/yr]	2623.7	664.3	664.4	664.4	626.4	664	601.8	664.4	626.5	626.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,131.77	$ 286.56	$ 286.6	$ 286.6	$ 270.21	$ 286.43	$ 259.6	$ 286.6	$ 270.25	$ 270.25
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21264	17848	17866	18118	17849	20980	17850	18136	17867	18119
Upgrade Package List	Pkg2231102033	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2231101032	Pkg2221101032	Pkg2221102033	Pkg2221101033	Pkg2221102032
GHGI [kg/m2]	10	2.87	2.87	2.87	2.73	2.87	2.64	2.87	2.73	2.73
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	44.6	45.6	44.7	45.1	45.6	45	45.6	44.1	44.7	45.1
Output: MEUI [kWh/(m2 * yr)]	54.9	34	33.6	33.8	33.2	33.7	32.7	33.4	32.8	33
Output: Better than ERS (%)	2990.0%	5190.0%	5230.0%	5210.0%	5270.0%	5220.0%	5320.0%	5250.0%	5300.0%	5290.0%
Output: Better than Envelope (%)	1630.0%	1450.0%	1630.0%	1550.0%	1450.0%	1560.0%	1450.0%	1730.0%	1630.0%	1550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	888	8788	8606	8687	8788	8671	8788	8506	8606	8687
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 125.22	$ 1,239.08	$ 1,213.42	$ 1,224.91	$ 1,239.08	$ 1,222.55	$ 1,239.08	$ 1,199.35	$ 1,213.42	$ 1,224.91
Annual savings in carbon tax for electricity [$/year]	$ .44	$ 4.39	$ 4.3	$ 4.34	$ 4.39	$ 4.34	$ 4.39	$ 4.25	$ 4.3	$ 4.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 125.67	$ 1,243.47	$ 1,217.72	$ 1,229.25	$ 1,243.47	$ 1,226.89	$ 1,243.47	$ 1,203.6	$ 1,217.72	$ 1,229.25
Annual savings in GHG from electricity savings [kg CO2e/year]	9.8	96.7	94.7	95.6	96.7	95.4	96.7	93.6	94.7	95.6
Annual savings in natural gas [m3/year]	107.21	180.21	180.21	180.21	181.62	180.22	182.54	180.21	181.62	181.62
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 993.26	$ 1,669.65	$ 1,669.61	$ 1,669.61	$ 1,682.73	$ 1,669.75	$ 1,691.22	$ 1,669.61	$ 1,682.7	$ 1,682.7
Annual savings in carbon tax for natural gas [$/year]	$ 247.91	$ 416.74	$ 416.73	$ 416.73	$ 420.	$ 416.76	$ 422.12	$ 416.73	$ 419.99	$ 419.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,241.17	$ 2,086.38	$ 2,086.34	$ 2,086.34	$ 2,102.73	$ 2,086.51	$ 2,113.34	$ 2,086.34	$ 2,102.69	$ 2,102.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	5509.2	9260.8	9260.6	9260.6	9333.4	9261.4	9380.5	9260.6	9333.2	9333.2
Net Present Value [$]	$ 7,499.18	$ 1,117.64	$ 1,090.1	$ 1,321.38	$ 1,350.26	$ 1,492.83	$ 1,444.26	$ 1,294.69	$ 1,322.48	$ 1,553.76
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.

LARGE Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,007.29	$ 19,007.29	$ 20,286.72	$ 20,597.29	$ 20,508.78	$ 19,557.29	$ 19,447.29	$ 19,468.78	$ 20,897.29	$ 20,726.72
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 22,573.25	$ 21,402.21	$ 22,842.85	$ 23,192.55	$ 23,092.89	$ 22,021.51	$ 21,897.65	$ 21,921.85	$ 23,530.35	$ 23,338.29
Net Present Value [$]	$ 292.05	$ 1,117.64	$ 104.04	$ 9.68	$ 93.66	$ 1,350.26	$ 1,090.1	$ 1,321.38	$ 110.57	$ 116.61
Incremental dollars per GHG saving	$ 2.07	$ 2.07	$ 2.09	$ 2.11	$ 2.11	$ 2.12	$ 2.12	$ 2.12	$ 2.13	$ 2.14
Auxiliary Energy Required Heating [GJ/yr]	84.1	83.9	84.7	84.1	83	83.9	82.1	82.9	84.1	82.9
Annual Energy DHW [GJ/yr]	14.3	24.7	14.3	13	14.3	23.3	24.7	24.7	12.3	14.3
Annual Energy Space Heating [GJ/yr]	33.5	33.5	33.7	33.5	33.1	33.5	32.8	33.1	33.5	33
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	77.9	88.6	78.2	76.7	77.6	87.1	87.9	88.2	76	77.6
Design Heating Load [W]	15654.2	16121.3	15697.4	15654.2	15466.3	16121.3	15944.7	15933.5	15654.2	15520.8
Annual Energy Electricity [kWh/yr]	17691.4	17726.7	17752.2	17692.5	17589.2	17726.7	17544.7	17626.2	17691	17586.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,440.02	$ 2,445.01	$ 2,448.62	$ 2,440.17	$ 2,425.56	$ 2,445.01	$ 2,419.26	$ 2,430.79	$ 2,439.96	$ 2,425.13
Annual Energy Natural Gas [m3/yr]	382.7	664.3	382.7	350.4	382.7	626.4	664.4	664.4	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 286.56	$ 165.08	$ 151.15	$ 165.08	$ 270.21	$ 286.6	$ 286.6	$ 142.09	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17869	17848	20983	17870	18139	17849	17866	18118	17871	21001
Upgrade Package List	Pkg2221101033	Pkg2221101032	Pkg2231101032	Pkg2221101033	Pkg2221102033	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101033	Pkg2231101033
GHGI [kg/m2]	1.81	2.87	1.82	1.69	1.81	2.73	2.87	2.87	1.62	1.81
% ICC	1.8%	1.7%	1.8%	1.8%	1.8%	1.7%	1.7%	1.7%	1.9%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	45.7	45.6	46	45.7	45.1	45.6	44.7	45.1	45.7	45.1
Output: MEUI [kWh/(m2 * yr)]	28.2	34	28.3	27.5	28	33.2	33.6	33.8	27.1	28
Output: Better than ERS (%)	5630.0%	5190.0%	5610.0%	5700.0%	5650.0%	5270.0%	5230.0%	5210.0%	5740.0%	5650.0%
Output: Better than Envelope (%)	1430.0%	1450.0%	1370.0%	1430.0%	1540.0%	1450.0%	1630.0%	1550.0%	1430.0%	1550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8752	8788	8813	8754	8650	8788	8606	8687	8752	8647
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,234.1	$ 1,239.08	$ 1,242.68	$ 1,234.26	$ 1,219.69	$ 1,239.08	$ 1,213.42	$ 1,224.91	$ 1,234.05	$ 1,219.27
Annual savings in carbon tax for electricity [$/year]	$ 4.38	$ 4.39	$ 4.41	$ 4.38	$ 4.33	$ 4.39	$ 4.3	$ 4.34	$ 4.38	$ 4.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,238.48	$ 1,243.47	$ 1,247.08	$ 1,238.63	$ 1,224.02	$ 1,243.47	$ 1,217.72	$ 1,229.25	$ 1,238.42	$ 1,223.59
Annual savings in GHG from electricity savings [kg CO2e/year]	96.3	96.7	96.9	96.3	95.2	96.7	94.7	95.6	96.3	95.1
Annual savings in natural gas [m3/year]	190.7	180.21	190.7	191.91	190.7	181.62	180.21	180.21	192.69	190.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,766.86	$ 1,669.65	$ 1,766.86	$ 1,778.01	$ 1,766.86	$ 1,682.73	$ 1,669.61	$ 1,669.61	$ 1,785.26	$ 1,766.86
Annual savings in carbon tax for natural gas [$/year]	$ 441.	$ 416.74	$ 441.	$ 443.78	$ 441.	$ 420.	$ 416.73	$ 416.73	$ 445.59	$ 441.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,207.86	$ 2,086.38	$ 2,207.86	$ 2,221.79	$ 2,207.86	$ 2,102.73	$ 2,086.34	$ 2,086.34	$ 2,230.85	$ 2,207.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	9800	9260.8	9800	9861.8	9800	9333.4	9260.6	9260.6	9902	9800
Net Present Value [$]	$ 292.05	$ 1,117.64	$ 104.04	$ 9.68	$ 93.66	$ 1,350.26	$ 1,090.1	$ 1,321.38	$ 110.57	$ 116.61
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$ 850.	$.

LARGE Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,888.21	$ 20,538.98	$ 21,000.47	$ 20,560.47	$ 21,038.98	$ 21,088.98	$ 20,648.98	$ 20,778.41	$ 21,218.41	$ 21,388.98
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 21,268.12	$ 23,126.89	$ 23,646.53	$ 23,151.09	$ 23,689.89	$ 23,746.19	$ 23,250.75	$ 23,396.49	$ 23,891.93	$ 24,083.99
Net Present Value [$]	$ 7,499.18	$ 6,034.87	$ 5,826.02	$ 5,824.45	$ 5,820.4	$ 5,752.81	$ 5,751.42	$ 5,642.	$ 5,641.7	$ 5,627.03
Incremental dollars per GHG saving	$ 3.42	$ 3.7	$ 3.74	$ 3.73	$ 3.75	$ 3.76	$ 3.74	$ 3.76	$ 3.78	$ 3.78
Auxiliary Energy Required Heating [GJ/yr]	82.1	79.6	78.6	80.3	78.4	79.6	81.4	80.2	78.4	79.6
Annual Energy DHW [GJ/yr]	12.3	14.3	14.3	14.3	14.3	13	13	14.3	14.3	12.3
Annual Energy Space Heating [GJ/yr]	87	84.3	83.2	85.1	83.1	84.3	86.2	84.9	83.1	84.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	126.7	126	124.9	126.8	124.7	124.8	126.7	126.6	124.7	124
Design Heating Load [W]	15257.4	14614.9	14427	14603.7	14577	14614.9	14791.5	14658.1	14481.5	14614.9
Annual Energy Electricity [kWh/yr]	8050.8	8037.2	8031.8	8041.3	8031.1	8037.3	8046.7	8040.5	8031.1	8037.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,075.87	$ 1,073.95	$ 1,073.18	$ 1,074.53	$ 1,073.09	$ 1,073.96	$ 1,075.29	$ 1,074.42	$ 1,073.09	$ 1,073.96
Annual Energy Natural Gas [m3/yr]	2623.7	2605.6	2577.1	2626.9	2573.4	2573.6	2623.4	2622.9	2573.3	2552.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,131.77	$ 1,123.97	$ 1,111.67	$ 1,133.15	$ 1,110.08	$ 1,110.16	$ 1,131.64	$ 1,131.43	$ 1,110.03	$ 1,101.19
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21264	35662	35878	35860	35680	35663	35645	37588	37606	35664
Upgrade Package List	Pkg2231102033	Pkg3221201033	Pkg3221202033	Pkg3221202032	Pkg3221201034	Pkg3221201033	Pkg3221201032	Pkg3231201032	Pkg3231201033	Pkg3221201033
GHGI [kg/m2]	10	9.94	9.83	10.02	9.82	9.82	10	10	9.81	9.74
% ICC	1.7%	1.8%	1.9%	1.8%	1.9%	1.9%	1.8%	1.8%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	44.6	43.3	42.7	43.7	42.6	43.3	44.2	43.6	42.6	43.3
Output: MEUI [kWh/(m2 * yr)]	54.9	54.5	54	55	53.9	53.9	54.9	54.9	53.9	53.5
Output: Better than ERS (%)	2990.0%	3030.0%	3090.0%	2990.0%	3100.0%	3100.0%	2990.0%	3000.0%	3100.0%	3140.0%
Output: Better than Envelope (%)	1630.0%	1890.0%	1990.0%	1810.0%	2010.0%	1890.0%	1700.0%	1820.0%	2010.0%	1890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	888	902	907	898	908	902	892	898	908	902
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 125.22	$ 127.14	$ 127.9	$ 126.56	$ 128.	$ 127.13	$ 125.8	$ 126.67	$ 128.	$ 127.13
Annual savings in carbon tax for electricity [$/year]	$ .44	$ .45	$ .45	$ .45	$ .45	$ .45	$ .45	$ .45	$ .45	$ .45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 125.67	$ 127.59	$ 128.35	$ 127.01	$ 128.45	$ 127.58	$ 126.25	$ 127.12	$ 128.45	$ 127.58
Annual savings in GHG from electricity savings [kg CO2e/year]	9.8	9.9	10	9.9	10	9.9	9.8	9.9	10	9.9
Annual savings in natural gas [m3/year]	107.21	107.88	108.94	107.09	109.08	109.07	107.22	107.23	109.08	109.85
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 993.26	$ 999.5	$ 1,009.34	$ 992.15	$ 1,010.62	$ 1,010.55	$ 993.36	$ 993.53	$ 1,010.65	$ 1,017.73
Annual savings in carbon tax for natural gas [$/year]	$ 247.91	$ 249.47	$ 251.93	$ 247.64	$ 252.25	$ 252.23	$ 247.94	$ 247.98	$ 252.25	$ 254.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,241.17	$ 1,248.97	$ 1,261.27	$ 1,239.79	$ 1,262.86	$ 1,262.78	$ 1,241.3	$ 1,241.51	$ 1,262.91	$ 1,271.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	5509.2	5543.8	5598.4	5503	5605.5	5605.1	5509.7	5510.7	5605.7	5644.9
Net Present Value [$]	$ 7,499.18	$ 6,034.87	$ 5,826.02	$ 5,824.45	$ 5,820.4	$ 5,752.81	$ 5,751.42	$ 5,642.	$ 5,641.7	$ 5,627.03
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	8.77	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.

LARGE Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 41,655.22	$ 41,925.67	$ 42,205.22	$ 42,294.21	$ 42,475.67	$ 42,505.22	$ 42,564.66	$ 42,756.89	$ 42,775.67	$ 42,844.21
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 46,903.78	$ 47,208.3	$ 47,523.08	$ 47,623.28	$ 47,827.6	$ 47,860.88	$ 47,927.81	$ 48,144.26	$ 48,165.4	$ 48,242.58
Net Present Value [$]	$ 15,108.41	$ 15,536.93	$ 15,341.03	$ 15,747.4	$ 15,769.55	$ 15,435.03	$ 16,175.92	$ 16,282.88	$ 15,863.54	$ 15,980.02
Incremental dollars per GHG saving	$ 4.53	$ 4.56	$ 4.55	$ 4.6	$ 4.58	$ 4.56	$ 4.63	$ 4.65	$ 4.59	$ 4.62
Auxiliary Energy Required Heating [GJ/yr]	52.5	53.1	52.5	52.5	53.1	52.5	53.1	52.9	53.1	52.5
Annual Energy DHW [GJ/yr]	24.8	24.7	23.3	24.8	23.3	22.4	24.7	24.7	22.4	23.3
Annual Energy Space Heating [GJ/yr]	21.4	21.6	21.4	21.4	21.6	21.4	21.6	21.5	21.6	21.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	76.5	76.7	75.1	76.5	75.3	74.1	76.7	76.6	74.3	75.1
Design Heating Load [W]	11700.4	11717.9	11700.4	11700.4	11717.9	11700.4	11717.9	11645.4	11717.9	11700.4
Annual Energy Electricity [kWh/yr]	14362.4	14424.7	14362.4	14362.4	14424.7	14362.4	14424.7	14391.6	14424.7	14362.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,968.96	$ 1,977.78	$ 1,968.96	$ 1,968.96	$ 1,977.78	$ 1,968.96	$ 1,977.78	$ 1,973.1	$ 1,977.78	$ 1,968.96
Annual Energy Natural Gas [m3/yr]	664.8	664.5	626.9	664.8	626.6	602.3	664.5	664.5	602	626.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.77	$ 286.64	$ 270.42	$ 286.77	$ 270.29	$ 259.81	$ 286.64	$ 286.64	$ 259.68	$ 270.42
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	52228	51797	52084	52229	51798	52516	52354	52230	52085
Upgrade Package List	Pkg4331303054	Pkg4341302054	Pkg4331303054	Pkg4331403054	Pkg4341302054	Pkg4331303054	Pkg4341402054	Pkg4341303053	Pkg4341302054	Pkg4331403054
GHGI [kg/m2]	2.8	2.8	2.66	2.8	2.66	2.57	2.8	2.8	2.57	2.66
% ICC	3.7%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.5	28.9	28.5	28.5	28.9	28.5	28.9	28.7	28.9	28.5
Output: MEUI [kWh/(m2 * yr)]	27.4	27.5	26.6	27.4	26.7	26.1	27.5	27.5	26.2	26.6
Output: Better than ERS (%)	5850.0%	5840.0%	5920.0%	5850.0%	5910.0%	5980.0%	5840.0%	5840.0%	5970.0%	5920.0%
Output: Better than Envelope (%)	4650.0%	4590.0%	4650.0%	4650.0%	4590.0%	4650.0%	4590.0%	4610.0%	4590.0%	4650.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5424	5486	5424	5424	5486	5424	5486	5453	5486	5424
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 764.71	$ 773.5	$ 764.71	$ 764.71	$ 773.5	$ 764.71	$ 773.5	$ 768.83	$ 773.5	$ 764.71
Annual savings in carbon tax for electricity [$/year]	$ 2.71	$ 2.74	$ 2.71	$ 2.71	$ 2.74	$ 2.71	$ 2.74	$ 2.73	$ 2.74	$ 2.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 767.43	$ 776.24	$ 767.43	$ 767.43	$ 776.24	$ 767.43	$ 776.24	$ 771.56	$ 776.24	$ 767.43
Annual savings in GHG from electricity savings [kg CO2e/year]	59.7	60.3	59.7	59.7	60.3	59.7	60.3	60	60.3	59.7
Annual savings in natural gas [m3/year]	180.19	180.2	181.6	180.19	181.61	182.52	180.2	180.2	182.53	181.6
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,669.48	$ 1,669.58	$ 1,682.56	$ 1,669.48	$ 1,682.66	$ 1,691.05	$ 1,669.58	$ 1,669.58	$ 1,691.15	$ 1,682.56
Annual savings in carbon tax for natural gas [$/year]	$ 416.69	$ 416.72	$ 419.96	$ 416.69	$ 419.98	$ 422.08	$ 416.72	$ 416.72	$ 422.1	$ 419.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,086.17	$ 2,086.3	$ 2,102.52	$ 2,086.17	$ 2,102.65	$ 2,113.13	$ 2,086.3	$ 2,086.3	$ 2,113.26	$ 2,102.52
Annual savings in GHG from natural gas savings [kg CO2e/year]	9259.8	9260.4	9332.4	9259.8	9333	9379.5	9260.4	9260.4	9380.1	9332.4
Net Present Value [$]	$ 15,108.41	$ 15,536.93	$ 15,341.03	$ 15,747.4	$ 15,769.55	$ 15,435.03	$ 16,175.92	$ 16,282.88	$ 15,863.54	$ 15,980.02
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.47	14.09	14.09	10.47	14.09	10.47	14.09	10.47	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$.	$ 850.	$ 550.

LARGE Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 41,655.22	$ 42,205.22	$ 41,925.67	$ 42,505.22	$ 42,475.67	$ 42,775.67	$ 42,294.21	$ 42,844.21	$ 42,564.66	$ 43,144.21
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 46,903.78	$ 47,523.08	$ 47,208.3	$ 47,860.88	$ 47,827.6	$ 48,165.4	$ 47,623.28	$ 48,242.58	$ 47,927.81	$ 48,580.38
Net Present Value [$]	$ 15,108.41	$ 15,341.03	$ 15,536.93	$ 15,435.03	$ 15,769.55	$ 15,863.54	$ 15,747.4	$ 15,980.02	$ 16,175.92	$ 16,074.02
Incremental dollars per GHG saving	$ 4.53	$ 4.55	$ 4.56	$ 4.56	$ 4.58	$ 4.59	$ 4.6	$ 4.62	$ 4.63	$ 4.63
Auxiliary Energy Required Heating [GJ/yr]	52.5	52.5	53.1	52.5	53.1	53.1	52.5	52.5	53.1	52.5
Annual Energy DHW [GJ/yr]	24.8	23.3	24.7	22.4	23.3	22.4	24.8	23.3	24.7	22.4
Annual Energy Space Heating [GJ/yr]	21.4	21.4	21.6	21.4	21.6	21.6	21.4	21.4	21.6	21.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	76.5	75.1	76.7	74.1	75.3	74.3	76.5	75.1	76.7	74.1
Design Heating Load [W]	11700.4	11700.4	11717.9	11700.4	11717.9	11717.9	11700.4	11700.4	11717.9	11700.4
Annual Energy Electricity [kWh/yr]	14362.4	14362.4	14424.7	14362.4	14424.7	14424.7	14362.4	14362.4	14424.7	14362.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,968.96	$ 1,968.96	$ 1,977.78	$ 1,968.96	$ 1,977.78	$ 1,977.78	$ 1,968.96	$ 1,968.96	$ 1,977.78	$ 1,968.96
Annual Energy Natural Gas [m3/yr]	664.8	626.9	664.5	602.3	626.6	602	664.8	626.9	664.5	602.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.77	$ 270.42	$ 286.64	$ 259.81	$ 270.29	$ 259.68	$ 286.77	$ 270.42	$ 286.64	$ 259.81
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	51797	52228	51798	52229	52230	52084	52085	52516	52086
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4341302054	Pkg4331303054	Pkg4341302054	Pkg4341302054	Pkg4331403054	Pkg4331403054	Pkg4341402054	Pkg4331403054
GHGI [kg/m2]	2.8	2.66	2.8	2.57	2.66	2.57	2.8	2.66	2.8	2.57
% ICC	3.7%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.5	28.5	28.9	28.5	28.9	28.9	28.5	28.5	28.9	28.5
Output: MEUI [kWh/(m2 * yr)]	27.4	26.6	27.5	26.1	26.7	26.2	27.4	26.6	27.5	26.1
Output: Better than ERS (%)	5850.0%	5920.0%	5840.0%	5980.0%	5910.0%	5970.0%	5850.0%	5920.0%	5840.0%	5980.0%
Output: Better than Envelope (%)	4650.0%	4650.0%	4590.0%	4650.0%	4590.0%	4590.0%	4650.0%	4650.0%	4590.0%	4650.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5424	5424	5486	5424	5486	5486	5424	5424	5486	5424
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 764.71	$ 764.71	$ 773.5	$ 764.71	$ 773.5	$ 773.5	$ 764.71	$ 764.71	$ 773.5	$ 764.71
Annual savings in carbon tax for electricity [$/year]	$ 2.71	$ 2.71	$ 2.74	$ 2.71	$ 2.74	$ 2.74	$ 2.71	$ 2.71	$ 2.74	$ 2.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 767.43	$ 767.43	$ 776.24	$ 767.43	$ 776.24	$ 776.24	$ 767.43	$ 767.43	$ 776.24	$ 767.43
Annual savings in GHG from electricity savings [kg CO2e/year]	59.7	59.7	60.3	59.7	60.3	60.3	59.7	59.7	60.3	59.7
Annual savings in natural gas [m3/year]	180.19	181.6	180.2	182.52	181.61	182.53	180.19	181.6	180.2	182.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,669.48	$ 1,682.56	$ 1,669.58	$ 1,691.05	$ 1,682.66	$ 1,691.15	$ 1,669.48	$ 1,682.56	$ 1,669.58	$ 1,691.05
Annual savings in carbon tax for natural gas [$/year]	$ 416.69	$ 419.96	$ 416.72	$ 422.08	$ 419.98	$ 422.1	$ 416.69	$ 419.96	$ 416.72	$ 422.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,086.17	$ 2,102.52	$ 2,086.3	$ 2,113.13	$ 2,102.65	$ 2,113.26	$ 2,086.17	$ 2,102.52	$ 2,086.3	$ 2,113.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	9259.8	9332.4	9260.4	9379.5	9333	9380.1	9259.8	9332.4	9260.4	9379.5
Net Present Value [$]	$ 15,108.41	$ 15,341.03	$ 15,536.93	$ 15,435.03	$ 15,769.55	$ 15,863.54	$ 15,747.4	$ 15,980.02	$ 16,175.92	$ 16,074.02
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.47	14.09	10.47	10.47	14.09	14.09	10.47	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 2,775.65	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,774.66	$ 4,774.66
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.

LARGE Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 41,655.22	$ 42,205.22	$ 42,505.22	$ 41,925.67	$ 42,294.21	$ 42,475.67	$ 42,775.67	$ 42,844.21	$ 43,144.21	$ 42,564.66
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 46,903.78	$ 47,523.08	$ 47,860.88	$ 47,208.3	$ 47,623.28	$ 47,827.6	$ 48,165.4	$ 48,242.58	$ 48,580.38	$ 47,927.81
Net Present Value [$]	$ 15,108.41	$ 15,341.03	$ 15,435.03	$ 15,536.93	$ 15,747.4	$ 15,769.55	$ 15,863.54	$ 15,980.02	$ 16,074.02	$ 16,175.92
Incremental dollars per GHG saving	$ 4.53	$ 4.55	$ 4.56	$ 4.56	$ 4.6	$ 4.58	$ 4.59	$ 4.62	$ 4.63	$ 4.63
Auxiliary Energy Required Heating [GJ/yr]	52.5	52.5	52.5	53.1	52.5	53.1	53.1	52.5	52.5	53.1
Annual Energy DHW [GJ/yr]	24.8	23.3	22.4	24.7	24.8	23.3	22.4	23.3	22.4	24.7
Annual Energy Space Heating [GJ/yr]	21.4	21.4	21.4	21.6	21.4	21.6	21.6	21.4	21.4	21.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	76.5	75.1	74.1	76.7	76.5	75.3	74.3	75.1	74.1	76.7
Design Heating Load [W]	11700.4	11700.4	11700.4	11717.9	11700.4	11717.9	11717.9	11700.4	11700.4	11717.9
Annual Energy Electricity [kWh/yr]	14362.4	14362.4	14362.4	14424.7	14362.4	14424.7	14424.7	14362.4	14362.4	14424.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,968.96	$ 1,968.96	$ 1,968.96	$ 1,977.78	$ 1,968.96	$ 1,977.78	$ 1,977.78	$ 1,968.96	$ 1,968.96	$ 1,977.78
Annual Energy Natural Gas [m3/yr]	664.8	626.9	602.3	664.5	664.8	626.6	602	626.9	602.3	664.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.77	$ 270.42	$ 259.81	$ 286.64	$ 286.77	$ 270.29	$ 259.68	$ 270.42	$ 259.81	$ 286.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	51797	51798	52228	52084	52229	52230	52085	52086	52516
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4331303054	Pkg4341302054	Pkg4331403054	Pkg4341302054	Pkg4341302054	Pkg4331403054	Pkg4331403054	Pkg4341402054
GHGI [kg/m2]	2.8	2.66	2.57	2.8	2.8	2.66	2.57	2.66	2.57	2.8
% ICC	3.7%	3.7%	3.8%	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	28.5	28.5	28.5	28.9	28.5	28.9	28.9	28.5	28.5	28.9
Output: MEUI [kWh/(m2 * yr)]	27.4	26.6	26.1	27.5	27.4	26.7	26.2	26.6	26.1	27.5
Output: Better than ERS (%)	5850.0%	5920.0%	5980.0%	5840.0%	5850.0%	5910.0%	5970.0%	5920.0%	5980.0%	5840.0%
Output: Better than Envelope (%)	4650.0%	4650.0%	4650.0%	4590.0%	4650.0%	4590.0%	4590.0%	4650.0%	4650.0%	4590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5424	5424	5424	5486	5424	5486	5486	5424	5424	5486
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 764.71	$ 764.71	$ 764.71	$ 773.5	$ 764.71	$ 773.5	$ 773.5	$ 764.71	$ 764.71	$ 773.5
Annual savings in carbon tax for electricity [$/year]	$ 2.71	$ 2.71	$ 2.71	$ 2.74	$ 2.71	$ 2.74	$ 2.74	$ 2.71	$ 2.71	$ 2.74
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 767.43	$ 767.43	$ 767.43	$ 776.24	$ 767.43	$ 776.24	$ 776.24	$ 767.43	$ 767.43	$ 776.24
Annual savings in GHG from electricity savings [kg CO2e/year]	59.7	59.7	59.7	60.3	59.7	60.3	60.3	59.7	59.7	60.3
Annual savings in natural gas [m3/year]	180.19	181.6	182.52	180.2	180.19	181.61	182.53	181.6	182.52	180.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,669.48	$ 1,682.56	$ 1,691.05	$ 1,669.58	$ 1,669.48	$ 1,682.66	$ 1,691.15	$ 1,682.56	$ 1,691.05	$ 1,669.58
Annual savings in carbon tax for natural gas [$/year]	$ 416.69	$ 419.96	$ 422.08	$ 416.72	$ 416.69	$ 419.98	$ 422.1	$ 419.96	$ 422.08	$ 416.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,086.17	$ 2,102.52	$ 2,113.13	$ 2,086.3	$ 2,086.17	$ 2,102.65	$ 2,113.26	$ 2,102.52	$ 2,113.13	$ 2,086.3
Annual savings in GHG from natural gas savings [kg CO2e/year]	9259.8	9332.4	9379.5	9260.4	9259.8	9333	9380.1	9332.4	9379.5	9260.4
Net Present Value [$]	$ 15,108.41	$ 15,341.03	$ 15,435.03	$ 15,536.93	$ 15,747.4	$ 15,769.55	$ 15,863.54	$ 15,980.02	$ 16,074.02	$ 16,175.92
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	10.47	14.09	10.47	10.47	14.09	14.09	10.47
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 2,775.65	$ 1,173.98	$ 2,775.65	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 2,775.65
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,774.66
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

LARGE Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 11,502.81	$ 11,964.3	$ 12,052.81	$ 12,102.81	$ 12,182.24	$ 12,352.81	$ 12,361.47	$ 12,452.81	$ 12,514.3	$ 12,564.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,277.22	$ 17,970.38	$ 18,103.32	$ 18,178.42	$ 18,297.72	$ 18,553.92	$ 18,566.93	$ 18,704.12	$ 18,796.48	$ 18,871.58
Net Present Value [$]	$ 14,725.21	$ 14,595.96	$ 14,556.4	$ 16,119.74	$ 14,421.28	$ 14,508.51	$ 13,359.	$ 12,649.07	$ 14,427.16	$ 15,990.49
Incremental dollars per GHG saving	$ 2.15	$ 2.21	$ 2.22	$ 2.09	$ 2.25	$ 2.25	$ 2.35	$ 2.43	$ 2.28	$ 2.14
Auxiliary Energy Required Heating [GJ/yr]	134.1	132.8	134.1	135.9	132.6	134.1	146.1	150.7	132.8	134.6
Annual Energy DHW [GJ/yr]	26.7	26.7	25	15.8	26.7	23.9	15.8	13.4	25	15.8
Annual Energy Space Heating [GJ/yr]	142.1	140.6	142.1	144	140.5	142.1	154.7	159.7	140.6	142.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	195.5	194.1	193.8	186.5	193.9	192.7	197.3	199.8	192.4	185.1
Design Heating Load [W]	21880	21657	21880	21470.9	21724.2	21880	21470.9	24179.9	21657	21247.8
Annual Energy Electricity [kWh/yr]	8142.8	8135.7	8142.8	8152.5	8134.9	8142.8	8205.9	8230.7	8135.7	8145.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,088.89	$ 1,087.89	$ 1,088.89	$ 1,090.26	$ 1,087.77	$ 1,088.89	$ 1,097.82	$ 1,101.33	$ 1,087.89	$ 1,089.26
Annual Energy Natural Gas [m3/yr]	4462.3	4424.8	4416.8	4221.2	4419.9	4386.7	4503.5	4569.7	4379.3	4183.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,924.88	$ 1,908.7	$ 1,905.25	$ 1,820.88	$ 1,906.59	$ 1,892.27	$ 1,942.65	$ 1,971.21	$ 1,889.08	$ 1,804.7
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64153	64423	64154	64156	65773	64155	64102	54438	64424	64426
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121101021	Pkg1121101031	Pkg2121102031	Pkg2121102031
GHGI [kg/m2]	16.9	16.75	16.72	15.99	16.74	16.61	17.05	17.3	16.58	15.85
% ICC	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	72.9	72.2	72.9	73.9	72.1	72.9	79.4	81.9	72.2	73.2
Output: MEUI [kWh/(m2 * yr)]	92.3	91.6	91.4	87.5	91.5	90.8	93.3	94.7	90.6	86.7
Output: Better than ERS (%)	1900.0%	1960.0%	1970.0%	2060.0%	1960.0%	2010.0%	1600.0%	1500.0%	2030.0%	2120.0%
Output: Better than Envelope (%)	1110.0%	1200.0%	1110.0%	990.0%	1210.0%	1110.0%	320.0%	10.0%	1200.0%	1080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1130	1138	1130	1121	1138	1130	1067	1042	1138	1128
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 159.39	$ 160.39	$ 159.39	$ 158.02	$ 160.5	$ 159.39	$ 150.49	$ 146.99	$ 160.39	$ 159.02
Annual savings in carbon tax for electricity [$/year]	$ .57	$ .57	$ .57	$ .56	$ .57	$ .57	$ .53	$ .52	$ .57	$ .56
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 159.95	$ 160.96	$ 159.95	$ 158.58	$ 161.07	$ 159.95	$ 151.02	$ 147.51	$ 160.96	$ 159.58
Annual savings in GHG from electricity savings [kg CO2e/year]	12.4	12.5	12.4	12.3	12.5	12.4	11.7	11.5	12.5	12.4
Annual savings in natural gas [m3/year]	103.72	105.12	105.42	112.7	105.3	106.54	102.19	99.72	106.81	114.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 960.98	$ 973.92	$ 976.69	$ 1,044.21	$ 975.62	$ 987.08	$ 946.76	$ 923.9	$ 989.63	$ 1,057.15
Annual savings in carbon tax for natural gas [$/year]	$ 239.86	$ 243.09	$ 243.78	$ 260.63	$ 243.51	$ 246.37	$ 236.31	$ 230.6	$ 247.01	$ 263.86
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,200.83	$ 1,217.01	$ 1,220.46	$ 1,304.84	$ 1,219.12	$ 1,233.45	$ 1,183.06	$ 1,154.51	$ 1,236.64	$ 1,321.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	5330.1	5401.9	5417.2	5791.8	5411.3	5474.9	5251.2	5124.5	5489	5863.6
Net Present Value [$]	$ 14,725.21	$ 14,595.96	$ 14,556.4	$ 16,119.74	$ 14,421.28	$ 14,508.51	$ 13,359.	$ 12,649.07	$ 14,427.16	$ 15,990.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$.	$ 850.	$ 550.	$.

LARGE Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,779.99	$ 14,019.42	$ 14,752.81	$ 14,152.81	$ 14,841.48	$ 14,329.99	$ 14,241.48	$ 15,059.42	$ 15,988.3	$ 16,026.81
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 20,697.54	$ 21,057.17	$ 22,158.72	$ 21,257.52	$ 22,291.9	$ 21,523.64	$ 21,390.7	$ 22,619.25	$ 24,014.43	$ 24,072.27
Net Present Value [$]	$ 8,441.16	$ 8,923.69	$ 6,274.12	$ 7,857.15	$ 7,017.36	$ 8,609.97	$ 8,511.56	$ 7,108.59	$ 12,010.42	$ 7,006.67
Incremental dollars per GHG saving	$ 1.12	$ 1.14	$ 1.15	$ 1.15	$ 1.16	$ 1.16	$ 1.16	$ 1.17	$ 1.17	$ 1.17
Auxiliary Energy Required Heating [GJ/yr]	155.5	156.3	150.2	148.4	156.3	155.5	154.1	156.1	155.1	141.7
Annual Energy DHW [GJ/yr]	26.7	26.7	15.8	26.7	15.8	25	26.7	15.8	9.1	9.1
Annual Energy Space Heating [GJ/yr]	74.4	74.8	73.7	73.3	74.4	74.4	73.9	74.2	75.9	68.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.1	1.1	1.8	1.8	1.8	1.8	1.1	1.1
Total Energy [GJ/yr]	129.1	129.4	117.2	127.8	118.1	127.4	128.5	118	112.7	105.6
Design Heating Load [W]	22455.2	22509.1	24275.4	24684.5	21822	22455.2	22232.1	21889.2	24461.4	21972.5
Annual Energy Electricity [kWh/yr]	28444.1	28539.9	28176.5	28068.9	28430.8	28444.1	28292.2	28381.6	31304	29345.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,961.53	$ 3,975.08	$ 3,923.66	$ 3,908.43	$ 3,959.64	$ 3,961.53	$ 3,940.03	$ 3,952.68	$ 4,366.2	$ 4,089.06
Annual Energy Natural Gas [m3/yr]	716.5	716.1	423.9	717.6	423.9	671	716.5	423.9	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.07	$ 308.9	$ 182.86	$ 309.55	$ 182.86	$ 289.45	$ 309.07	$ 182.86	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64090	65692	54445	54442	64363	64091	64360	65713	54718	64168
Upgrade Package List	Pkg2121101013	Pkg2131101012	Pkg1121101031	Pkg1121101031	Pkg2121102013	Pkg2121101013	Pkg2121102013	Pkg2131101013	Pkg1121102031	Pkg2121101031
GHGI [kg/m2]	3.3	3.3	2.19	3.29	2.2	3.13	3.29	2.2	0.67	0.63
% ICC	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	84.5	85	81.7	80.7	85	84.5	83.8	84.8	84.3	77
Output: MEUI [kWh/(m2 * yr)]	56.2	56.4	49.7	55.4	50.2	55.3	55.9	50.1	47.2	43.4
Output: Better than ERS (%)	4480.0%	4470.0%	4850.0%	4540.0%	4810.0%	4550.0%	4510.0%	4810.0%	5070.0%	5380.0%
Output: Better than Envelope (%)	300.0%	360.0%	50.0%	170.0%	360.0%	300.0%	210.0%	340.0%	280.0%	610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19171	19267	18903	18796	19158	19171	19019	19108	22031	20072
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,703.1	$ 2,716.6	$ 2,665.37	$ 2,650.19	$ 2,701.22	$ 2,703.1	$ 2,681.68	$ 2,694.28	$ 3,106.34	$ 2,830.18
Annual savings in carbon tax for electricity [$/year]	$ 9.59	$ 9.63	$ 9.45	$ 9.4	$ 9.58	$ 9.59	$ 9.51	$ 9.55	$ 11.02	$ 10.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,712.68	$ 2,726.24	$ 2,674.82	$ 2,659.59	$ 2,710.8	$ 2,712.68	$ 2,691.19	$ 2,703.84	$ 3,117.36	$ 2,840.22
Annual savings in GHG from electricity savings [kg CO2e/year]	210.9	211.9	207.9	206.8	210.7	210.9	209.2	210.2	242.3	220.8
Annual savings in natural gas [m3/year]	243.29	243.3	254.19	243.24	254.19	244.98	243.29	254.19	269.98	269.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,254.04	$ 2,254.18	$ 2,355.05	$ 2,253.66	$ 2,355.05	$ 2,269.75	$ 2,254.04	$ 2,355.05	$ 2,501.38	$ 2,501.38
Annual savings in carbon tax for natural gas [$/year]	$ 562.6	$ 562.63	$ 587.81	$ 562.5	$ 587.81	$ 566.52	$ 562.6	$ 587.81	$ 624.33	$ 624.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,816.64	$ 2,816.81	$ 2,942.86	$ 2,816.17	$ 2,942.86	$ 2,836.27	$ 2,816.64	$ 2,942.86	$ 3,125.71	$ 3,125.71
Annual savings in GHG from natural gas savings [kg CO2e/year]	12502.2	12503	13062.4	12500.1	13062.4	12589.3	12502.2	13062.4	13874.1	13874.1
Net Present Value [$]	$ 8,441.16	$ 8,923.69	$ 6,274.12	$ 7,857.15	$ 7,017.36	$ 8,609.97	$ 8,511.56	$ 7,108.59	$ 12,010.42	$ 7,006.67
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$ 2,672.82	$ 2,672.82	$.	$.	$.	$.	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$.	$.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$ 600.	$.	$.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.

LARGE Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,102.81	$ 12,564.3	$ 15,097.29	$ 12,652.81	$ 12,782.24	$ 15,558.78	$ 12,952.81	$ 13,114.3	$ 15,647.29	$ 13,243.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 18,178.42	$ 18,871.58	$ 22,676.13	$ 19,004.52	$ 19,198.92	$ 23,369.29	$ 19,455.12	$ 19,697.68	$ 23,502.23	$ 19,892.08
Net Present Value [$]	$ 16,119.74	$ 15,990.49	$ 15,937.42	$ 15,890.88	$ 15,815.2	$ 15,807.45	$ 15,803.49	$ 15,762.05	$ 15,709.17	$ 15,685.23
Incremental dollars per GHG saving	$ 2.09	$ 2.14	$ 2.35	$ 2.15	$ 2.17	$ 2.4	$ 2.19	$ 2.2	$ 2.41	$ 2.22
Auxiliary Energy Required Heating [GJ/yr]	135.9	134.6	124.6	136	134.4	123.2	136	134.6	124.6	133.1
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	15.8	15.8	13.4	14.3	14.3	15.8
Annual Energy Space Heating [GJ/yr]	144	142.6	132	144	142.4	130.5	144	142.6	132	141
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	186.5	185.1	174.5	185.1	184.9	173.1	184.2	183.7	173.1	183.5
Design Heating Load [W]	21470.9	21247.8	20183.1	21470.9	21315	19960	21470.9	21247.8	20183.1	21092
Annual Energy Electricity [kWh/yr]	8152.5	8145.4	8092.5	8152.6	8144.5	8085.4	8152.7	8145.5	8092.5	8137.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,090.26	$ 1,089.26	$ 1,081.77	$ 1,090.28	$ 1,089.13	$ 1,080.77	$ 1,090.29	$ 1,089.27	$ 1,081.77	$ 1,088.13
Annual Energy Natural Gas [m3/yr]	4221.2	4183.7	3903.9	4182.8	4178.9	3866.5	4157.4	4145.3	3865.5	4141.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,820.88	$ 1,804.7	$ 1,684.01	$ 1,804.31	$ 1,802.63	$ 1,667.87	$ 1,793.36	$ 1,788.14	$ 1,667.44	$ 1,786.5
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64156	64426	70528	64157	65776	70798	64158	64427	70529	66046
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2121101031	Pkg2131101031	Pkg2221102031	Pkg2121101031	Pkg2121102031	Pkg2221101031	Pkg2131102031
GHGI [kg/m2]	15.99	15.85	14.8	15.85	15.83	14.66	15.75	15.71	14.66	15.69
% ICC	1.1%	1.1%	1.3%	1.1%	1.1%	1.4%	1.1%	1.2%	1.4%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	73.9	73.2	67.7	73.9	73.1	67	73.9	73.2	67.7	72.3
Output: MEUI [kWh/(m2 * yr)]	87.5	86.7	80.9	86.7	86.6	80.2	86.2	85.9	80.2	85.8
Output: Better than ERS (%)	2060.0%	2120.0%	2570.0%	2120.0%	2130.0%	2630.0%	2160.0%	2180.0%	2630.0%	2190.0%
Output: Better than Envelope (%)	990.0%	1080.0%	1740.0%	990.0%	1090.0%	1840.0%	990.0%	1080.0%	1740.0%	1180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1121	1128	1181	1121	1129	1188	1120	1128	1181	1136
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 158.02	$ 159.02	$ 166.48	$ 158.	$ 159.15	$ 167.48	$ 157.99	$ 159.01	$ 166.48	$ 160.15
Annual savings in carbon tax for electricity [$/year]	$ .56	$ .56	$ .59	$ .56	$ .56	$ .59	$ .56	$ .56	$ .59	$ .57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 158.58	$ 159.58	$ 167.07	$ 158.56	$ 159.71	$ 168.07	$ 158.55	$ 159.57	$ 167.07	$ 160.72
Annual savings in GHG from electricity savings [kg CO2e/year]	12.3	12.4	13	12.3	12.4	13.1	12.3	12.4	13	12.5
Annual savings in natural gas [m3/year]	112.7	114.1	124.53	114.14	114.28	125.92	115.08	115.53	125.96	115.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,044.21	$ 1,057.15	$ 1,153.74	$ 1,057.46	$ 1,058.81	$ 1,166.65	$ 1,066.23	$ 1,070.41	$ 1,167.	$ 1,071.72
Annual savings in carbon tax for natural gas [$/year]	$ 260.63	$ 263.86	$ 287.97	$ 263.94	$ 264.27	$ 291.19	$ 266.13	$ 267.17	$ 291.28	$ 267.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,304.84	$ 1,321.01	$ 1,441.71	$ 1,321.4	$ 1,323.08	$ 1,457.84	$ 1,332.36	$ 1,337.58	$ 1,458.27	$ 1,339.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	5791.8	5863.6	6399.3	5865.3	5872.8	6470.9	5913.9	5937.1	6472.8	5944.4
Net Present Value [$]	$ 16,119.74	$ 15,990.49	$ 15,937.42	$ 15,890.88	$ 15,815.2	$ 15,807.45	$ 15,803.49	$ 15,762.05	$ 15,709.17	$ 15,685.23
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	3.87	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 9,440.93	$ 6,446.45	$ 6,446.45	$ 9,440.93	$ 6,446.45	$ 6,446.45	$ 9,440.93	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$ 550.	$.

LARGE Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,788.21	$ 19,007.29	$ 19,338.21	$ 19,447.29	$ 19,468.78	$ 19,557.29	$ 19,607.29	$ 19,638.21	$ 19,686.72	$ 19,857.29
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 28,219.89	$ 28,548.95	$ 29,045.99	$ 29,209.83	$ 29,242.11	$ 29,375.05	$ 29,450.15	$ 29,496.59	$ 29,569.45	$ 29,825.65
Net Present Value [$]	$ 2,545.27	$ 2,663.19	$ 2,714.32	$ 2,403.88	$ 2,753.11	$ 2,831.26	$ 1,039.5	$ 2,762.21	$ 2,874.54	$ 2,879.15
Incremental dollars per GHG saving	$ 1.52	$ 1.54	$ 1.56	$ 1.58	$ 1.58	$ 1.57	$ 1.52	$ 1.57	$ 1.6	$ 1.59
Auxiliary Energy Required Heating [GJ/yr]	119.7	117.8	119.7	115.6	116.5	117.8	119.5	119.7	116.4	117.8
Annual Energy DHW [GJ/yr]	26.7	26.7	25	26.7	26.7	25	15.8	23.9	26.7	23.9
Annual Energy Space Heating [GJ/yr]	59.3	58.5	59.3	57.5	58	58.5	58.8	59.3	57.9	58.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.1	1.8	1.8	1.8	1.8	1.1	1.8	1.8
Total Energy [GJ/yr]	113.8	113.7	112.1	112.7	113.2	112	103.1	111	113.1	110.9
Design Heating Load [W]	20305.7	19860.6	20305.7	19650.8	19637.5	19860.6	19450.5	20305.7	19704.7	19860.6
Annual Energy Electricity [kWh/yr]	24207.4	24166.1	24207.4	23894.5	24021.8	24166.1	24257.6	24207.4	23985.6	24166.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,362.03	$ 3,356.19	$ 3,362.03	$ 3,317.76	$ 3,335.77	$ 3,356.19	$ 3,369.14	$ 3,362.03	$ 3,330.65	$ 3,356.19
Annual Energy Natural Gas [m3/yr]	716.9	717.5	671.4	717.5	717.5	671.9	423.9	641.3	717.1	641.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.25	$ 309.5	$ 289.62	$ 309.5	$ 309.5	$ 289.83	$ 182.86	$ 276.63	$ 309.33	$ 276.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	73936	70552	73937	70570	70822	70553	70555	73938	73684	70554
Upgrade Package List	Pkg2231102031	Pkg2221101032	Pkg2231102031	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101032	Pkg2231102031	Pkg2231101032	Pkg2221101032
GHGI [kg/m2]	3.21	3.2	3.04	3.04	3.21	3.04	2.11	2.92	3.2	2.93
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	65.1	64.1	65.1	62.9	63.3	64.1	65	65.1	63.3	64.1
Output: MEUI [kWh/(m2 * yr)]	47.9	47.8	47	47.3	47.5	46.9	42	46.3	47.4	46.3
Output: Better than ERS (%)	5130.0%	5140.0%	5210.0%	5180.0%	5160.0%	5210.0%	5470.0%	5250.0%	5160.0%	5260.0%
Output: Better than Envelope (%)	2070.0%	2190.0%	2070.0%	2340.0%	2280.0%	2190.0%	2080.0%	2070.0%	2290.0%	2190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14934	14893	14934	14621	14749	14893	14984	14934	14712	14893
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,105.72	$ 2,099.9	$ 2,105.72	$ 2,061.6	$ 2,079.55	$ 2,099.9	$ 2,112.8	$ 2,105.72	$ 2,074.45	$ 2,099.9
Annual savings in carbon tax for electricity [$/year]	$ 7.47	$ 7.45	$ 7.47	$ 7.31	$ 7.37	$ 7.45	$ 7.49	$ 7.47	$ 7.36	$ 7.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,113.19	$ 2,107.35	$ 2,113.19	$ 2,068.91	$ 2,086.93	$ 2,107.35	$ 2,120.29	$ 2,113.19	$ 2,081.8	$ 2,107.35
Annual savings in GHG from electricity savings [kg CO2e/year]	164.3	163.8	164.3	160.8	162.2	163.8	164.8	164.3	161.8	163.8
Annual savings in natural gas [m3/year]	243.27	243.25	244.97	243.25	243.25	244.95	254.19	246.09	243.26	246.07
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,253.91	$ 2,253.7	$ 2,269.61	$ 2,253.7	$ 2,253.7	$ 2,269.44	$ 2,355.05	$ 2,280.	$ 2,253.84	$ 2,279.83
Annual savings in carbon tax for natural gas [$/year]	$ 562.56	$ 562.51	$ 566.48	$ 562.51	$ 562.51	$ 566.44	$ 587.81	$ 569.08	$ 562.55	$ 569.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,816.47	$ 2,816.21	$ 2,836.1	$ 2,816.21	$ 2,816.21	$ 2,835.88	$ 2,942.86	$ 2,849.08	$ 2,816.38	$ 2,848.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	12501.4	12500.3	12588.5	12500.3	12500.3	12587.6	13062.4	12646.2	12501	12645.2
Net Present Value [$]	$ 2,545.27	$ 2,663.19	$ 2,714.32	$ 2,403.88	$ 2,753.11	$ 2,831.26	$ 1,039.5	$ 2,762.21	$ 2,874.54	$ 2,879.15
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$.	$ 850.

LARGE Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 19,607.29	$ 18,788.21	$ 19,007.29	$ 20,047.29	$ 20,157.29	$ 20,068.78	$ 19,338.21	$ 20,457.29	$ 20,286.72	$ 19,638.21
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,450.15	$ 28,219.89	$ 28,548.95	$ 30,111.03	$ 30,276.25	$ 30,143.31	$ 29,045.99	$ 30,726.85	$ 30,470.65	$ 29,496.59
Net Present Value [$]	$ 1,039.5	$ 2,545.27	$ 2,663.19	$ 780.2	$ 1,268.8	$ 1,129.8	$ 2,714.32	$ 1,355.89	$ 1,257.54	$ 2,762.21
Incremental dollars per GHG saving	$ 1.52	$ 1.52	$ 1.54	$ 1.55	$ 1.55	$ 1.56	$ 1.56	$ 1.57	$ 1.57	$ 1.57
Auxiliary Energy Required Heating [GJ/yr]	119.5	119.7	117.8	117.3	119.5	118.1	119.7	119.5	118	119.7
Annual Energy DHW [GJ/yr]	15.8	26.7	26.7	15.8	14.3	15.8	25	13.4	15.8	23.9
Annual Energy Space Heating [GJ/yr]	58.8	59.3	58.5	57.9	58.9	58.3	59.3	58.9	58.2	59.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.1	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.1
Total Energy [GJ/yr]	103.1	113.8	113.7	102.1	101.7	102.6	112.1	100.7	102.5	111
Design Heating Load [W]	19450.5	20305.7	19860.6	19240.7	19450.5	19227.4	20305.7	19450.5	19294.6	20305.7
Annual Energy Electricity [kWh/yr]	24257.6	24207.4	24166.1	23986	24259.2	24113.4	24207.4	24260.2	24078.4	24207.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,369.14	$ 3,362.03	$ 3,356.19	$ 3,330.7	$ 3,369.36	$ 3,348.73	$ 3,362.03	$ 3,369.5	$ 3,343.78	$ 3,362.03
Annual Energy Natural Gas [m3/yr]	423.9	716.9	717.5	423.9	385.1	423.9	671.4	359.4	423.9	641.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 309.25	$ 309.5	$ 182.86	$ 166.12	$ 182.86	$ 289.62	$ 155.03	$ 182.86	$ 276.63
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70555	73936	70552	70573	70556	70825	73937	70557	73687	73938
Upgrade Package List	Pkg2221101032	Pkg2231102031	Pkg2221101032	Pkg2221101033	Pkg2221101032	Pkg2221102032	Pkg2231102031	Pkg2221101032	Pkg2231101032	Pkg2231102031
GHGI [kg/m2]	2.11	3.21	3.21	2.1	1.97	2.11	3.04	1.87	2.11	2.92
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.7%	1.8%	1.8%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Chosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	65	65.1	64.1	63.8	65	64.2	65.1	65	64.2	65.1
Output: MEUI [kWh/(m2 * yr)]	42	47.9	47.8	41.5	41.3	41.8	47	40.7	41.7	46.3
Output: Better than ERS (%)	5470.0%	5130.0%	5140.0%	5510.0%	5530.0%	5490.0%	5210.0%	5570.0%	5490.0%	5250.0%
Output: Better than Envelope (%)	2080.0%	2070.0%	2190.0%	2230.0%	2080.0%	2170.0%	2070.0%	2080.0%	2180.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14984	14934	14893	14713	14986	14840	14934	14987	14805	14934
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,112.8	$ 2,105.72	$ 2,099.9	$ 2,074.5	$ 2,113.03	$ 2,092.47	$ 2,105.72	$ 2,113.17	$ 2,087.53	$ 2,105.72
Annual savings in carbon tax for electricity [$/year]	$ 7.49	$ 7.47	$ 7.45	$ 7.36	$ 7.49	$ 7.42	$ 7.47	$ 7.49	$ 7.4	$ 7.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,120.29	$ 2,113.19	$ 2,107.35	$ 2,081.86	$ 2,120.52	$ 2,099.89	$ 2,113.19	$ 2,120.66	$ 2,094.94	$ 2,113.19
Annual savings in GHG from electricity savings [kg CO2e/year]	164.8	164.3	163.8	161.8	164.8	163.2	164.3	164.9	162.9	164.3
Annual savings in natural gas [m3/year]	254.19	243.27	243.25	254.19	255.63	254.19	244.97	256.59	254.19	246.09
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,355.05	$ 2,253.91	$ 2,253.7	$ 2,355.05	$ 2,368.44	$ 2,355.05	$ 2,269.61	$ 2,377.32	$ 2,355.05	$ 2,280.
Annual savings in carbon tax for natural gas [$/year]	$ 587.81	$ 562.56	$ 562.51	$ 587.81	$ 591.15	$ 587.81	$ 566.48	$ 593.37	$ 587.81	$ 569.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,942.86	$ 2,816.47	$ 2,816.21	$ 2,942.86	$ 2,959.6	$ 2,942.86	$ 2,836.1	$ 2,970.68	$ 2,942.86	$ 2,849.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	13062.4	12501.4	12500.3	13062.4	13136.7	13062.4	12588.5	13185.9	13062.4	12646.2
Net Present Value [$]	$ 1,039.5	$ 2,545.27	$ 2,663.19	$ 780.2	$ 1,268.8	$ 1,129.8	$ 2,714.32	$ 1,355.89	$ 1,257.54	$ 2,762.21
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	NA	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.

LARGE Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,535.3	$ 22,996.79	$ 23,035.3	$ 23,085.3	$ 22,556.79	$ 23,385.3	$ 23,214.73	$ 23,496.79	$ 22,645.3	$ 23,546.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,848.02	$ 34,541.18	$ 34,599.02	$ 34,674.12	$ 33,880.3	$ 35,124.72	$ 34,868.52	$ 35,292.18	$ 34,013.24	$ 35,367.28
Net Present Value [$]	$ 13,406.05	$ 13,275.17	$ 13,219.18	$ 13,177.62	$ 13,173.85	$ 13,090.05	$ 13,088.41	$ 13,087.87	$ 13,075.93	$ 13,046.67
Incremental dollars per GHG saving	$ 2.98	$ 3.01	$ 3.02	$ 3.02	$ 3.	$ 3.04	$ 3.03	$ 3.05	$ 3.01	$ 3.05
Auxiliary Energy Required Heating [GJ/yr]	102.9	101.5	101.6	102.9	103.7	102.9	101.4	100.3	105.1	101.5
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	15.8	13.4	15.8	15.8	14.3	14.3
Annual Energy Space Heating [GJ/yr]	109	107.5	107.6	109	109.9	109	107.4	106.2	111.3	107.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	152.2	150.8	150.8	150.7	153.1	149.8	150.6	149.4	153.1	149.3
Design Heating Load [W]	16916.9	16693.9	16872	16916.9	16903.6	16916.9	16761.1	16648.9	17126.7	16693.9
Annual Energy Electricity [kWh/yr]	8160.2	8153.2	8153.5	8160.3	8164.7	8160.4	8152.5	8146.5	8171.9	8153.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,091.35	$ 1,090.36	$ 1,090.41	$ 1,091.37	$ 1,091.99	$ 1,091.38	$ 1,090.26	$ 1,089.41	$ 1,093.01	$ 1,090.36
Annual Energy Natural Gas [m3/yr]	3297.3	3260	3262	3258.9	3321.1	3233.5	3256.5	3224.7	3320	3221.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,422.34	$ 1,406.25	$ 1,407.11	$ 1,405.78	$ 1,432.61	$ 1,394.82	$ 1,404.74	$ 1,391.02	$ 1,432.13	$ 1,389.69
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96142	96358	96160	96143	96340	96144	98086	96376	96125	96359
Upgrade Package List	Pkg3321201033	Pkg3321202033	Pkg3321201034	Pkg3321201033	Pkg3321202032	Pkg3321201033	Pkg3331201033	Pkg3321202034	Pkg3321201032	Pkg3321202033
GHGI [kg/m2]	12.53	12.39	12.4	12.39	12.62	12.29	12.38	12.26	12.62	12.25
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.0%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	55.9	55.2	55.2	55.9	56.4	55.9	55.1	54.5	57.1	55.2
Output: MEUI [kWh/(m2 * yr)]	68.8	68	68.1	68	69.3	67.5	67.9	67.3	69.3	67.2
Output: Better than ERS (%)	3520.0%	3580.0%	3580.0%	3590.0%	3490.0%	3630.0%	3590.0%	3640.0%	3490.0%	3650.0%
Output: Better than Envelope (%)	3180.0%	3270.0%	3270.0%	3180.0%	3130.0%	3180.0%	3280.0%	3350.0%	3040.0%	3270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1113	1120	1120	1113	1108	1113	1121	1127	1101	1120
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 156.93	$ 157.92	$ 157.88	$ 156.92	$ 156.3	$ 156.9	$ 158.02	$ 158.86	$ 155.28	$ 157.92
Annual savings in carbon tax for electricity [$/year]	$ .56	$ .56	$ .56	$ .56	$ .55	$ .56	$ .56	$ .56	$ .55	$ .56
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 157.49	$ 158.48	$ 158.44	$ 157.48	$ 156.85	$ 157.46	$ 158.58	$ 159.43	$ 155.83	$ 158.48
Annual savings in GHG from electricity savings [kg CO2e/year]	12.2	12.3	12.3	12.2	12.2	12.2	12.3	12.4	12.1	12.3
Annual savings in natural gas [m3/year]	147.13	148.52	148.44	148.56	146.24	149.51	148.65	149.83	146.28	149.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,363.14	$ 1,376.02	$ 1,375.33	$ 1,376.4	$ 1,354.93	$ 1,385.17	$ 1,377.23	$ 1,388.2	$ 1,355.31	$ 1,389.27
Annual savings in carbon tax for natural gas [$/year]	$ 340.23	$ 343.45	$ 343.28	$ 343.54	$ 338.18	$ 345.73	$ 343.75	$ 346.49	$ 338.28	$ 346.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,703.37	$ 1,719.46	$ 1,718.6	$ 1,719.94	$ 1,693.11	$ 1,730.9	$ 1,720.97	$ 1,734.69	$ 1,693.58	$ 1,736.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	7560.7	7632.2	7628.3	7634.3	7515.2	7682.9	7638.9	7699.8	7517.3	7705.7
Net Present Value [$]	$ 13,406.05	$ 13,275.17	$ 13,219.18	$ 13,177.62	$ 13,173.85	$ 13,090.05	$ 13,088.41	$ 13,087.87	$ 13,075.93	$ 13,046.67
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 550.

LARGE Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTanklessG0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTanklessG0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTanklessG0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 37,650.59	$ 37,830.02	$ 37,868.53	$ 37,944.57	$ 38,124.	$ 38,200.59	$ 38,324.	$ 38,330.02	$ 38,380.02	$ 38,418.53
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,551.19	$ 56,820.69	$ 56,878.53	$ 56,992.74	$ 57,262.25	$ 57,377.29	$ 57,562.65	$ 57,571.69	$ 57,646.79	$ 57,704.63
Net Present Value [$]	$ 10,345.11	$ 10,425.23	$ 10,573.49	$ 3,894.23	$ 3,762.49	$ 10,513.91	$ 3,653.05	$ 10,666.52	$ 10,594.03	$ 10,741.57
Incremental dollars per GHG saving	$ 3.04	$ 3.06	$ 3.06	$ 4.29	$ 4.3	$ 3.06	$ 4.32	$ 3.09	$ 3.08	$ 3.08
Auxiliary Energy Required Heating [GJ/yr]	84.9	84.7	84.8	81.2	81	84.9	79.8	83.5	84.7	84.8
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	13.4	13.4	25	14.3	26.7	25	25
Annual Energy Space Heating [GJ/yr]	43	42.9	42.9	86	85.8	43	84.5	42.4	42.9	42.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	98.4	98.2	98.4	126.8	126.6	96.7	126.3	97.9	96.5	96.7
Design Heating Load [W]	15621	15510.1	15688.2	14064.2	13953.3	15621	13908.4	15465.1	15510.1	15688.2
Annual Energy Electricity [kWh/yr]	19907.3	19870.7	19915.6	8045.8	8044.8	19907.3	8038.3	19772.2	19870.7	19915.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,753.57	$ 2,748.39	$ 2,754.74	$ 1,075.17	$ 1,075.02	$ 2,753.57	$ 1,074.1	$ 2,734.45	$ 2,748.39	$ 2,754.74
Annual Energy Natural Gas [m3/yr]	717.8	717.2	716.5	2628.4	2623	672.3	2614.2	716.6	671.7	670.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.63	$ 309.38	$ 309.07	$ 1,133.8	$ 1,131.47	$ 290.01	$ 1,127.67	$ 309.12	$ 289.75	$ 289.4
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	96490	98416	98218	103776	104334	96491	104351	98434	98417	98219
Upgrade Package List	Pkg3321202054	Pkg3331202053	Pkg3331201054	Pkg4321302054	Pkg4331302053	Pkg3321202054	Pkg4331302054	Pkg3331202054	Pkg3331202053	Pkg3331201054
GHGI [kg/m2]	3.12	3.12	3.11	10.02	10	2.95	9.97	3.11	2.94	2.94
% ICC	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	46.1	46	46.1	44.2	44.1	46.1	43.4	45.4	46	46.1
Output: MEUI [kWh/(m2 * yr)]	39.5	39.4	39.5	55	54.9	38.6	54.7	39.2	38.5	38.5
Output: Better than ERS (%)	5790.0%	5800.0%	5790.0%	4600.0%	4610.0%	5870.0%	4630.0%	5810.0%	5870.0%	5870.0%
Output: Better than Envelope (%)	4370.0%	4390.0%	4380.0%	4620.0%	4630.0%	4370.0%	4710.0%	4470.0%	4390.0%	4380.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10634	10598	10642	1227	1228	10634	1235	10499	10598	10642
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,499.41	$ 1,494.25	$ 1,500.58	$ 173.06	$ 173.2	$ 1,499.41	$ 174.12	$ 1,480.36	$ 1,494.25	$ 1,500.58
Annual savings in carbon tax for electricity [$/year]	$ 5.32	$ 5.3	$ 5.32	$ .61	$ .61	$ 5.32	$ .62	$ 5.25	$ 5.3	$ 5.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,504.73	$ 1,499.55	$ 1,505.9	$ 173.68	$ 173.82	$ 1,504.73	$ 174.74	$ 1,485.61	$ 1,499.55	$ 1,505.9
Annual savings in GHG from electricity savings [kg CO2e/year]	117	116.6	117.1	13.5	13.5	117	13.6	115.5	116.6	117.1
Annual savings in natural gas [m3/year]	243.24	243.26	243.29	172.05	172.25	244.93	172.58	243.28	244.96	244.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,253.59	$ 2,253.8	$ 2,254.04	$ 1,594.05	$ 1,595.91	$ 2,269.3	$ 1,598.95	$ 2,254.01	$ 2,269.51	$ 2,269.78
Annual savings in carbon tax for natural gas [$/year]	$ 562.49	$ 562.54	$ 562.6	$ 397.87	$ 398.33	$ 566.41	$ 399.09	$ 562.59	$ 566.46	$ 566.53
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,816.08	$ 2,816.34	$ 2,816.64	$ 1,991.91	$ 1,994.24	$ 2,835.71	$ 1,998.04	$ 2,816.6	$ 2,835.97	$ 2,836.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	12499.7	12500.8	12502.2	8841.5	8851.8	12586.8	8868.7	12502	12588	12589.5
Net Present Value [$]	$ 10,345.11	$ 10,425.23	$ 10,573.49	$ 3,894.23	$ 3,762.49	$ 10,513.91	$ 3,653.05	$ 10,666.52	$ 10,594.03	$ 10,741.57
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	10.47	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 4,135.67	$ 3,141.69	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTanklessG0.95	BCGasTanklessG0.95	NBC HotWater gas	BCGasTanklessG0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$.	$.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$ 600.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$ 850.	$ 550.	$ 550.	$.	$ 550.	$ 550.

LARGE Fort St John: Step5 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 38,930.02	$ 39,480.02	$ 41,698.	$ 37,650.59	$ 39,780.02	$ 37,830.02	$ 39,581.81	$ 37,868.53	$ 38,200.59	$ 39,744.57
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 58,472.89	$ 59,298.99	$ 62,630.4	$ 56,551.19	$ 59,749.59	$ 56,820.69	$ 59,451.88	$ 56,878.53	$ 57,377.29	$ 59,696.34
Net Present Value [$]	$ 8,954.14	$ 9,182.71	$ 14,313.09	$ 10,345.11	$ 9,269.97	$ 10,425.23	$ 9,540.02	$ 10,573.49	$ 10,513.91	$ 8,515.43
Incremental dollars per GHG saving	$ 3.01	$ 3.03	$ 3.04	$ 3.04	$ 3.04	$ 3.06	$ 3.06	$ 3.06	$ 3.06	$ 3.07
Auxiliary Energy Required Heating [GJ/yr]	84.9	84.9	85.1	84.9	84.9	84.7	84.5	84.8	84.9	82.2
Annual Energy DHW [GJ/yr]	15.8	14.3	9.1	26.7	13.4	26.7	15.8	26.7	25	15.8
Annual Energy Space Heating [GJ/yr]	42.7	42.7	42.3	43	42.7	42.9	42.6	42.9	43	41
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	87.2	85.7	80	98.4	84.8	98.2	87.1	98.4	96.7	85.4
Design Heating Load [W]	15057.8	15057.8	14378.6	15621	15057.8	15510.1	15082.6	15688.2	15621	14186.2
Annual Energy Electricity [kWh/yr]	19826.3	19827.7	22211.9	19907.3	19828.7	19870.7	19800.7	19915.6	19907.3	19339.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,742.11	$ 2,742.3	$ 3,079.67	$ 2,753.57	$ 2,742.45	$ 2,748.39	$ 2,738.48	$ 2,754.74	$ 2,753.57	$ 2,673.22
Annual Energy Natural Gas [m3/yr]	423.9	385.1	0	717.8	359.4	717.2	423.9	716.5	672.3	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 166.12	$.	$ 309.63	$ 155.03	$ 309.38	$ 182.86	$ 309.07	$ 290.01	$ 182.86
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	98437	98438	104362	96490	98439	98416	96709	98218	96491	103765
Upgrade Package List	Pkg3331202054	Pkg3331202054	Pkg4331302054	Pkg3321202054	Pkg3331202054	Pkg3331202053	Pkg3321203054	Pkg3331201054	Pkg3321202054	Pkg4321302053
GHGI [kg/m2]	2.02	1.87	0.48	3.12	1.77	3.12	2.01	3.11	2.95	2
% ICC	3.5%	3.5%	3.7%	3.3%	3.5%	3.4%	3.5%	3.4%	3.4%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.2	46.2	46.2	46.1	46.2	46	46	46.1	46.1	44.7
Output: MEUI [kWh/(m2 * yr)]	33.4	32.6	29.5	39.5	32.1	39.4	33.3	39.5	38.6	32.4
Output: Better than ERS (%)	6170.0%	6230.0%	6500.0%	5790.0%	6270.0%	5800.0%	6170.0%	5790.0%	5870.0%	6250.0%
Output: Better than Envelope (%)	4370.0%	4370.0%	4360.0%	4370.0%	4370.0%	4390.0%	4400.0%	4380.0%	4370.0%	4550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10553	10554	12939	10634	10556	10598	10528	10642	10634	10066
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,487.99	$ 1,488.18	$ 1,824.36	$ 1,499.41	$ 1,488.33	$ 1,494.25	$ 1,484.38	$ 1,500.58	$ 1,499.41	$ 1,419.35
Annual savings in carbon tax for electricity [$/year]	$ 5.28	$ 5.28	$ 6.47	$ 5.32	$ 5.28	$ 5.3	$ 5.26	$ 5.32	$ 5.32	$ 5.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,493.26	$ 1,493.46	$ 1,830.83	$ 1,504.73	$ 1,493.6	$ 1,499.55	$ 1,489.64	$ 1,505.9	$ 1,504.73	$ 1,424.38
Annual savings in GHG from electricity savings [kg CO2e/year]	116.1	116.1	142.3	117	116.1	116.6	115.8	117.1	117	110.7
Annual savings in natural gas [m3/year]	254.19	255.63	269.98	243.24	256.59	243.26	254.19	243.29	244.93	254.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,355.05	$ 2,368.44	$ 2,501.38	$ 2,253.59	$ 2,377.32	$ 2,253.8	$ 2,355.05	$ 2,254.04	$ 2,269.3	$ 2,355.05
Annual savings in carbon tax for natural gas [$/year]	$ 587.81	$ 591.15	$ 624.33	$ 562.49	$ 593.37	$ 562.54	$ 587.81	$ 562.6	$ 566.41	$ 587.81
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,942.86	$ 2,959.6	$ 3,125.71	$ 2,816.08	$ 2,970.68	$ 2,816.34	$ 2,942.86	$ 2,816.64	$ 2,835.71	$ 2,942.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	13062.4	13136.7	13874.1	12499.7	13185.9	12500.8	13062.4	12502.2	12586.8	13062.4
Net Present Value [$]	$ 8,954.14	$ 9,182.71	$ 14,313.09	$ 10,345.11	$ 9,269.97	$ 10,425.23	$ 9,540.02	$ 10,573.49	$ 10,513.91	$ 8,515.43
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	14.09	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$.	$ 600.	$.	$ 600.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$.	$.	$.	$ 550.	$.

LARGE Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 37,944.57	$ 38,124.	$ 38,324.	$ 38,624.	$ 38,583.56	$ 38,775.79	$ 38,762.99	$ 38,975.79	$ 38,962.99	$ 39,275.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,992.74	$ 57,262.25	$ 57,562.65	$ 58,013.25	$ 57,952.51	$ 58,241.24	$ 58,222.01	$ 58,541.64	$ 58,522.41	$ 58,992.24
Net Present Value [$]	$ 3,894.23	$ 3,762.49	$ 3,653.05	$ 3,566.58	$ 3,255.24	$ 3,197.7	$ 3,123.5	$ 3,089.18	$ 3,014.06	$ 3,002.34
Incremental dollars per GHG saving	$ 4.29	$ 4.3	$ 4.32	$ 4.33	$ 4.36	$ 4.37	$ 4.37	$ 4.38	$ 4.39	$ 4.39
Auxiliary Energy Required Heating [GJ/yr]	81.2	81	79.8	79.8	81.2	80.7	81	79.4	79.8	79.5
Annual Energy DHW [GJ/yr]	13.4	13.4	14.3	13.4	13.4	13.4	13.4	14.3	14.3	13.4
Annual Energy Space Heating [GJ/yr]	86	85.8	84.5	84.5	86	85.5	85.8	84.2	84.5	84.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	126.8	126.6	126.3	125.3	126.8	126.3	126.6	125.9	126.3	125
Design Heating Load [W]	14064.2	13953.3	13908.4	13908.4	14064.2	13978.1	13953.3	13933.2	13908.4	13933.2
Annual Energy Electricity [kWh/yr]	8045.8	8044.8	8038.3	8038.3	8045.8	8043	8044.8	8036.4	8038.3	8036.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,075.17	$ 1,075.02	$ 1,074.1	$ 1,074.1	$ 1,075.17	$ 1,074.77	$ 1,075.02	$ 1,073.84	$ 1,074.1	$ 1,073.85
Annual Energy Natural Gas [m3/yr]	2628.4	2623	2614.2	2588.7	2628.4	2613.2	2623	2604.3	2614.2	2578.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,133.8	$ 1,131.47	$ 1,127.67	$ 1,116.67	$ 1,133.8	$ 1,127.24	$ 1,131.47	$ 1,123.4	$ 1,127.67	$ 1,112.4
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	103776	104334	104351	104352	104064	103902	104622	103919	104639	103920
Upgrade Package List	Pkg4321302054	Pkg4331302053	Pkg4331302054	Pkg4331302054	Pkg4321402054	Pkg4321303053	Pkg4331402053	Pkg4321303054	Pkg4331402054	Pkg4321303054
GHGI [kg/m2]	10.02	10	9.97	9.87	10.02	9.96	10	9.93	9.97	9.84
% ICC	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	44.2	44.1	43.4	43.4	44.2	43.9	44.1	43.2	43.4	43.2
Output: MEUI [kWh/(m2 * yr)]	55	54.9	54.7	54.2	55	54.7	54.9	54.5	54.7	54
Output: Better than ERS (%)	4600.0%	4610.0%	4630.0%	4670.0%	4600.0%	4630.0%	4610.0%	4640.0%	4630.0%	4680.0%
Output: Better than Envelope (%)	4620.0%	4630.0%	4710.0%	4710.0%	4620.0%	4650.0%	4630.0%	4740.0%	4710.0%	4730.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1227	1228	1235	1235	1227	1230	1228	1237	1235	1237
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 173.06	$ 173.2	$ 174.12	$ 174.12	$ 173.06	$ 173.46	$ 173.2	$ 174.39	$ 174.12	$ 174.37
Annual savings in carbon tax for electricity [$/year]	$ .61	$ .61	$ .62	$ .62	$ .61	$ .62	$ .61	$ .62	$ .62	$ .62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 173.68	$ 173.82	$ 174.74	$ 174.74	$ 173.68	$ 174.07	$ 173.82	$ 175.01	$ 174.74	$ 174.99
Annual savings in GHG from electricity savings [kg CO2e/year]	13.5	13.5	13.6	13.6	13.5	13.5	13.5	13.6	13.6	13.6
Annual savings in natural gas [m3/year]	172.05	172.25	172.58	173.53	172.05	172.62	172.25	172.95	172.58	173.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,594.05	$ 1,595.91	$ 1,598.95	$ 1,607.75	$ 1,594.05	$ 1,599.3	$ 1,595.91	$ 1,602.37	$ 1,598.95	$ 1,611.17
Annual savings in carbon tax for natural gas [$/year]	$ 397.87	$ 398.33	$ 399.09	$ 401.29	$ 397.87	$ 399.18	$ 398.33	$ 399.94	$ 399.09	$ 402.14
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,991.91	$ 1,994.24	$ 1,998.04	$ 2,009.04	$ 1,991.91	$ 1,998.47	$ 1,994.24	$ 2,002.31	$ 1,998.04	$ 2,013.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	8841.5	8851.8	8868.7	8917.5	8841.5	8870.6	8851.8	8887.6	8868.7	8936.5
Net Present Value [$]	$ 3,894.23	$ 3,762.49	$ 3,653.05	$ 3,566.58	$ 3,255.24	$ 3,197.7	$ 3,123.5	$ 3,089.18	$ 3,014.06	$ 3,002.34
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	14.09	10.47	14.09	10.47	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,774.66	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$ 850.

LARGE Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60
Total increase in construction cost [$]	$ 11,502.81	$ 11,964.3	$ 12,052.81	$ 12,102.81	$ 12,182.24	$ 12,352.81	$ 12,361.47	$ 12,514.3	$ 12,564.3	$ 12,643.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,277.22	$ 17,970.38	$ 18,103.32	$ 18,178.42	$ 18,297.72	$ 18,553.92	$ 18,566.93	$ 18,796.48	$ 18,871.58	$ 18,990.88
Net Present Value [$]	$ 18,593.94	$ 18,535.02	$ 18,441.15	$ 20,127.89	$ 18,351.42	$ 18,404.91	$ 17,546.15	$ 18,381.98	$ 20,070.42	$ 18,292.24
Incremental dollars per GHG saving	$ 1.86	$ 1.91	$ 1.92	$ 1.82	$ 1.94	$ 1.95	$ 2.01	$ 1.97	$ 1.86	$ 1.99
Auxiliary Energy Required Heating [GJ/yr]	170.7	169	170.7	172	168.9	170.7	181.4	169	170.4	167.3
Annual Energy DHW [GJ/yr]	27.1	27.1	25.3	16.2	27.1	24.2	16.2	25.3	16.2	27.1
Annual Energy Space Heating [GJ/yr]	180.8	179.1	180.8	182.2	178.9	180.8	192.1	179.1	180.5	177.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	234.7	233	232.9	225.1	232.8	231.7	235.1	231.2	223.4	231.1
Design Heating Load [W]	23669.9	23431.2	23669.9	23218.1	23499.2	23669.9	23218.1	23431.2	22979.4	23260.5
Annual Energy Electricity [kWh/yr]	8340.9	8332.3	8340.9	8347.9	8331.6	8340.9	8397.5	8332.3	8339.3	8323
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,116.92	$ 1,115.71	$ 1,116.92	$ 1,117.91	$ 1,115.61	$ 1,116.92	$ 1,124.93	$ 1,115.71	$ 1,116.7	$ 1,114.39
Annual Energy Natural Gas [m3/yr]	5495.5	5450.1	5448.1	5238.6	5446.2	5416.6	5500.7	5402.7	5193	5400.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,370.57	$ 2,350.98	$ 2,350.12	$ 2,259.75	$ 2,349.3	$ 2,336.53	$ 2,372.81	$ 2,330.54	$ 2,240.08	$ 2,329.72
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116857	117127	116858	116860	118477	116859	116806	117128	117130	118747
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121101021	Pkg2121102031	Pkg2121102031	Pkg2131102031
GHGI [kg/m2]	20.77	20.6	20.59	19.81	20.59	20.48	20.79	20.42	19.64	20.42
% ICC	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92.8	91.9	92.8	93.5	91.8	92.8	98.6	91.9	92.6	90.9
Output: MEUI [kWh/(m2 * yr)]	113.6	112.7	112.7	108.5	112.6	112	113.9	111.7	107.5	111.7
Output: Better than ERS (%)	1910.0%	1970.0%	1970.0%	2050.0%	1970.0%	2010.0%	1700.0%	2030.0%	2110.0%	2030.0%
Output: Better than Envelope (%)	80.0%	20.0%	80.0%	160.0%	20.0%	80.0%	710.0%	20.0%	60.0%	120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1222	1231	1222	1215	1231	1222	1166	1231	1224	1240
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 172.32	$ 173.53	$ 172.32	$ 171.33	$ 173.63	$ 172.32	$ 164.34	$ 173.53	$ 172.54	$ 174.84
Annual savings in carbon tax for electricity [$/year]	$ .61	$ .62	$ .61	$ .61	$ .62	$ .61	$ .58	$ .62	$ .61	$ .62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 172.93	$ 174.14	$ 172.93	$ 171.94	$ 174.24	$ 172.93	$ 164.92	$ 174.14	$ 173.15	$ 175.46
Annual savings in GHG from electricity savings [kg CO2e/year]	13.4	13.5	13.4	13.4	13.5	13.4	12.8	13.5	13.5	13.6
Annual savings in natural gas [m3/year]	119.88	121.57	121.65	129.45	121.72	122.82	119.69	123.34	131.15	123.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,110.69	$ 1,126.37	$ 1,127.06	$ 1,199.38	$ 1,127.71	$ 1,137.93	$ 1,108.9	$ 1,142.73	$ 1,215.12	$ 1,143.38
Annual savings in carbon tax for natural gas [$/year]	$ 277.22	$ 281.14	$ 281.31	$ 299.36	$ 281.47	$ 284.02	$ 276.78	$ 285.22	$ 303.29	$ 285.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,387.92	$ 1,407.5	$ 1,408.36	$ 1,498.74	$ 1,409.18	$ 1,421.95	$ 1,385.67	$ 1,427.95	$ 1,518.41	$ 1,428.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	6160.5	6247.5	6251.3	6652.4	6254.9	6311.6	6150.6	6338.2	6739.7	6341.9
Net Present Value [$]	$ 18,593.94	$ 18,535.02	$ 18,441.15	$ 20,127.89	$ 18,351.42	$ 18,404.91	$ 17,546.15	$ 18,381.98	$ 20,070.42	$ 18,292.24
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$.	$ 550.	$.	$.

LARGE Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,652.81	$ 15,252.81	$ 16,026.81	$ 14,911.47	$ 15,511.47	$ 15,114.3	$ 15,202.81	$ 16,488.3	$ 15,714.3	$ 15,802.81
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,008.52	$ 22,909.72	$ 24,072.27	$ 22,397.03	$ 23,298.23	$ 22,701.68	$ 22,834.62	$ 24,765.43	$ 23,602.88	$ 23,735.82
Net Present Value [$]	$ 10,510.01	$ 8,746.68	$ 14,871.28	$ 12,927.62	$ 11,214.07	$ 10,400.74	$ 10,662.07	$ 14,755.62	$ 8,629.92	$ 8,963.18
Incremental dollars per GHG saving	$ .98	$ .98	$ .98	$ .99	$ 1.	$ 1.01	$ 1.01	$ 1.01	$ 1.01	$ 1.01
Auxiliary Energy Required Heating [GJ/yr]	170.2	171.5	178.3	179.3	180.9	168.6	170.2	176.6	169.9	171.5
Annual Energy DHW [GJ/yr]	27.1	16.2	9.3	27.1	16.2	27.1	25.4	9.3	16.2	14.7
Annual Energy Space Heating [GJ/yr]	93.5	93.6	97	97.1	97.3	92.7	93.5	96.2	92.8	93.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	149.3	138.5	134.9	152.3	141.6	148.5	147.5	134.1	137.7	137
Design Heating Load [W]	23769.2	23316.4	23769.2	23769.2	23316.4	23530.5	23769.2	23530.5	23077.7	23316.4
Annual Energy Electricity [kWh/yr]	33930.9	33972.1	37462.8	34770.5	34830	33709.2	33930.9	37238.6	33747.5	33973.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,737.91	$ 4,743.74	$ 5,237.67	$ 4,856.71	$ 4,865.13	$ 4,706.54	$ 4,737.91	$ 5,205.95	$ 4,711.96	$ 4,743.99
Annual Energy Natural Gas [m3/yr]	728.9	434.1	0	728.6	434.1	728.9	681.4	0	434.1	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.42	$ 187.26	$.	$ 314.29	$ 187.26	$ 314.42	$ 293.93	$.	$ 187.26	$ 169.83
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116866	116869	116872	116812	116815	117136	116867	117142	117139	116870
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg2121101021	Pkg2121101021	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031
GHGI [kg/m2]	3.46	2.36	0.81	3.48	2.38	3.46	3.28	0.8	2.35	2.21
% ICC	1.3%	1.4%	1.4%	1.3%	1.4%	1.3%	1.3%	1.5%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92.5	93.2	96.9	97.5	98.3	91.6	92.5	96	92.3	93.2
Output: MEUI [kWh/(m2 * yr)]	67.1	61.2	59.2	68.7	62.9	66.6	66.1	58.8	60.7	60.4
Output: Better than ERS (%)	4680.0%	4940.0%	5100.0%	4570.0%	4830.0%	4710.0%	4740.0%	5130.0%	4970.0%	4990.0%
Output: Better than Envelope (%)	50.0%	130.0%	530.0%	590.0%	690.0%	40.0%	50.0%	430.0%	40.0%	130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	24368	24409	27900	25208	25267	24146	24368	27676	24184	24411
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,435.87	$ 3,441.68	$ 3,933.87	$ 3,554.26	$ 3,562.65	$ 3,404.61	$ 3,435.87	$ 3,902.26	$ 3,410.01	$ 3,441.94
Annual savings in carbon tax for electricity [$/year]	$ 12.18	$ 12.2	$ 13.95	$ 12.6	$ 12.63	$ 12.07	$ 12.18	$ 13.84	$ 12.09	$ 12.21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,448.06	$ 3,453.89	$ 3,947.82	$ 3,566.86	$ 3,575.28	$ 3,416.69	$ 3,448.06	$ 3,916.1	$ 3,422.11	$ 3,454.14
Annual savings in GHG from electricity savings [kg CO2e/year]	268	268.5	306.9	277.3	277.9	265.6	268	304.4	266	268.5
Annual savings in natural gas [m3/year]	297.48	308.46	324.64	297.49	308.46	297.48	299.25	324.64	308.46	309.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,756.14	$ 2,857.91	$ 3,007.76	$ 2,756.25	$ 2,857.91	$ 2,756.14	$ 2,772.54	$ 3,007.76	$ 2,857.91	$ 2,871.85
Annual savings in carbon tax for natural gas [$/year]	$ 687.92	$ 713.32	$ 750.72	$ 687.95	$ 713.32	$ 687.92	$ 692.01	$ 750.72	$ 713.32	$ 716.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,444.06	$ 3,571.23	$ 3,758.48	$ 3,444.19	$ 3,571.23	$ 3,444.06	$ 3,464.55	$ 3,758.48	$ 3,571.23	$ 3,588.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	15287.1	15851.6	16682.7	15287.7	15851.6	15287.1	15378.1	16682.7	15851.6	15928.9
Net Present Value [$]	$ 10,510.01	$ 8,746.68	$ 14,871.28	$ 12,927.62	$ 11,214.07	$ 10,400.74	$ 10,662.07	$ 14,755.62	$ 8,629.92	$ 8,963.18
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,931.48	$ 2,931.48	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$ 1,374.	$.	$ 600.	$.	$.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.

LARGE Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AttticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,097.29	$ 15,558.78	$ 15,647.29	$ 15,776.72	$ 16,108.78	$ 15,947.29	$ 16,238.21	$ 16,897.29	$ 12,102.81	$ 16,408.78
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,676.13	$ 23,369.29	$ 23,502.23	$ 23,696.63	$ 24,195.39	$ 23,952.83	$ 24,389.79	$ 25,379.73	$ 18,178.42	$ 24,645.99
Net Present Value [$]	$ 20,465.67	$ 20,407.65	$ 20,250.76	$ 20,217.86	$ 20,192.74	$ 20,173.33	$ 20,157.96	$ 20,149.33	$ 20,127.89	$ 20,115.13
Incremental dollars per GHG saving	$ 2.04	$ 2.08	$ 2.1	$ 2.11	$ 2.13	$ 2.12	$ 2.15	$ 2.17	$ 1.82	$ 2.16
Auxiliary Energy Required Heating [GJ/yr]	158.5	156.9	158.6	156.8	156.9	158.6	155.2	150.7	172	156.9
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	16.2	14.7	13.7	16.2	16.2	16.2	13.7
Annual Energy Space Heating [GJ/yr]	167.9	166.2	167.9	166.1	166.2	168	164.4	159.6	182.2	166.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.8	1.2	1.2
Total Energy [GJ/yr]	210.9	209.2	209.4	209	207.7	208.4	207.3	203.2	225.1	206.7
Design Heating Load [W]	21839.9	21601.2	21839.9	21669.1	21601.2	21839.9	21430.4	20733.5	23218.1	21601.2
Annual Energy Electricity [kWh/yr]	8276.8	8268.2	8276.8	8267.6	8268.2	8276.9	8259	8413.1	8347.9	8268.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,107.85	$ 1,106.64	$ 1,107.85	$ 1,106.55	$ 1,106.64	$ 1,107.87	$ 1,105.33	$ 1,127.14	$ 1,117.91	$ 1,106.65
Annual Energy Natural Gas [m3/yr]	4862.6	4817.1	4822.6	4813.9	4777.1	4796	4768.6	4643.6	5238.6	4750.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,097.56	$ 2,077.93	$ 2,080.3	$ 2,076.55	$ 2,060.67	$ 2,068.83	$ 2,057.01	$ 2,003.09	$ 2,259.75	$ 2,049.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	123232	123502	123233	126364	123503	123234	126634	123268	116860	123504
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2231102031	Pkg2221101033	Pkg2121101031	Pkg2221102031
GHGI [kg/m2]	18.4	18.23	18.25	18.22	18.08	18.15	18.05	17.58	19.81	17.98
% ICC	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.1%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	86.2	85.3	86.2	85.2	85.3	86.2	84.4	81.9	93.5	85.3
Output: MEUI [kWh/(m2 * yr)]	100.7	99.8	99.9	99.7	99	99.4	98.8	96.5	108.5	98.4
Output: Better than ERS (%)	2560.0%	2620.0%	2610.0%	2620.0%	2670.0%	2640.0%	2680.0%	2830.0%	2050.0%	2700.0%
Output: Better than Envelope (%)	640.0%	730.0%	630.0%	740.0%	730.0%	630.0%	830.0%	1100.0%	160.0%	730.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1286	1295	1286	1295	1295	1286	1304	1150	1215	1295
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 181.35	$ 182.57	$ 181.35	$ 182.65	$ 182.57	$ 181.34	$ 183.86	$ 162.14	$ 171.33	$ 182.55
Annual savings in carbon tax for electricity [$/year]	$ .64	$ .65	$ .64	$ .65	$ .65	$ .64	$ .65	$ .57	$ .61	$ .65
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 182.	$ 183.21	$ 182.	$ 183.3	$ 183.21	$ 181.98	$ 184.52	$ 162.71	$ 171.94	$ 183.2
Annual savings in GHG from electricity savings [kg CO2e/year]	14.1	14.2	14.1	14.2	14.2	14.1	14.3	12.6	13.4	14.2
Annual savings in natural gas [m3/year]	143.46	145.16	144.95	145.28	146.65	145.94	146.96	151.62	129.45	147.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,329.17	$ 1,344.88	$ 1,342.98	$ 1,345.98	$ 1,358.69	$ 1,352.16	$ 1,361.62	$ 1,404.77	$ 1,199.38	$ 1,367.87
Annual savings in carbon tax for natural gas [$/year]	$ 331.76	$ 335.68	$ 335.2	$ 335.95	$ 339.12	$ 337.49	$ 339.85	$ 350.62	$ 299.36	$ 341.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,660.93	$ 1,680.56	$ 1,678.18	$ 1,681.94	$ 1,697.81	$ 1,689.66	$ 1,701.48	$ 1,755.4	$ 1,498.74	$ 1,709.28
Annual savings in GHG from natural gas savings [kg CO2e/year]	7372.3	7459.5	7448.9	7465.6	7536	7499.9	7552.3	7791.7	6652.4	7587
Net Present Value [$]	$ 20,465.67	$ 20,407.65	$ 20,250.76	$ 20,217.86	$ 20,192.74	$ 20,173.33	$ 20,157.96	$ 20,149.33	$ 20,127.89	$ 20,115.13
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 6,446.45	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$.	$.	$ 850.

LARGE Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 23,385.3	$ 23,496.79	$ 23,546.79	$ 23,550.47	$ 23,585.3	$ 23,588.98	$ 23,676.22	$ 23,714.73	$ 23,764.73	$ 23,768.41
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,124.72	$ 35,292.18	$ 35,367.28	$ 35,372.81	$ 35,425.12	$ 35,430.65	$ 35,561.68	$ 35,619.52	$ 35,694.62	$ 35,700.15
Net Present Value [$]	$ 18,708.13	$ 18,764.38	$ 18,725.61	$ 8,025.79	$ 18,609.19	$ 8,263.5	$ 18,685.06	$ 18,567.43	$ 18,531.75	$ 8,185.56
Incremental dollars per GHG saving	$ 2.63	$ 2.63	$ 2.63	$ 1.56	$ 2.64	$ 1.57	$ 2.64	$ 2.65	$ 2.66	$ 1.58
Auxiliary Energy Required Heating [GJ/yr]	132.6	129.6	131	138.4	131.3	138.8	129.2	129.6	130.9	138.4
Annual Energy DHW [GJ/yr]	13.7	16.2	14.7	27.2	14.7	27.2	16.2	16.2	14.7	27.1
Annual Energy Space Heating [GJ/yr]	140.5	137.3	138.7	76.7	139.1	77	136.9	137.2	138.6	76.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	181.5	180.9	180.8	133.4	181.1	133.7	180.5	180.8	180.7	133.3
Design Heating Load [W]	18278.2	17991.4	18039.5	19530.7	18230.1	19721.3	17868.8	18059.4	18107.5	19598.6
Annual Energy Electricity [kWh/yr]	8317.4	8301.7	8308.7	29508.2	8310.4	29585.3	8299.6	8301.3	8308.2	29486.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,113.6	$ 1,111.38	$ 1,112.37	$ 4,112.1	$ 1,112.61	$ 4,123.	$ 1,111.08	$ 1,111.32	$ 1,112.3	$ 4,109.08
Annual Energy Natural Gas [m3/yr]	4070.5	4055.3	4051.8	729.4	4060.6	729.5	4044	4052.9	4049.1	729
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,755.87	$ 1,749.32	$ 1,747.81	$ 314.64	$ 1,751.6	$ 314.68	$ 1,744.44	$ 1,748.28	$ 1,746.64	$ 314.47
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	148848	149080	149063	141292	148865	141094	151006	150808	150791	143020
Upgrade Package List	Pkg3321201033	Pkg3321202034	Pkg3321202033	Pkg3321202033	Pkg3321201034	Pkg3221201034	Pkg3331202033	Pkg3331201034	Pkg3331201033	Pkg3231201033
GHGI [kg/m2]	15.43	15.37	15.36	3.37	15.39	3.37	15.33	15.36	15.35	3.37
% ICC	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	72.1	70.5	71.2	75.3	71.4	75.4	70.3	70.4	71.1	75.2
Output: MEUI [kWh/(m2 * yr)]	84.8	84.4	84.4	58.4	84.5	58.6	84.2	84.4	84.3	58.3
Output: Better than ERS (%)	3590.0%	3610.0%	3620.0%	5250.0%	3610.0%	5240.0%	3630.0%	3620.0%	3620.0%	5250.0%
Output: Better than Envelope (%)	2170.0%	2340.0%	2260.0%	1830.0%	2240.0%	1800.0%	2370.0%	2340.0%	2270.0%	1830.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1246	1261	1254	19945	1253	20022	1263	1262	1255	19924
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 175.63	$ 177.84	$ 176.86	$ 2,812.27	$ 176.62	$ 2,823.14	$ 178.14	$ 177.9	$ 176.93	$ 2,809.27
Annual savings in carbon tax for electricity [$/year]	$ .62	$ .63	$ .63	$ 9.97	$ .63	$ 10.01	$ .63	$ .63	$ .63	$ 9.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 176.25	$ 178.47	$ 177.48	$ 2,822.25	$ 177.24	$ 2,833.16	$ 178.77	$ 178.53	$ 177.55	$ 2,819.23
Annual savings in GHG from electricity savings [kg CO2e/year]	13.7	13.9	13.8	219.4	13.8	220.2	13.9	13.9	13.8	219.2
Annual savings in natural gas [m3/year]	172.97	173.54	173.67	297.46	173.34	297.46	173.96	173.63	173.77	297.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,602.61	$ 1,607.86	$ 1,609.06	$ 2,755.97	$ 1,606.03	$ 2,755.94	$ 1,611.76	$ 1,608.68	$ 1,610.	$ 2,756.11
Annual savings in carbon tax for natural gas [$/year]	$ 400.	$ 401.31	$ 401.61	$ 687.88	$ 400.86	$ 687.87	$ 402.29	$ 401.52	$ 401.85	$ 687.91
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,002.61	$ 2,009.17	$ 2,010.68	$ 3,443.85	$ 2,006.88	$ 3,443.8	$ 2,014.04	$ 2,010.2	$ 2,011.84	$ 3,444.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	8889	8918.1	8924.8	15286.2	8907.9	15286	8939.7	8922.7	8929.9	15286.9
Net Present Value [$]	$ 18,708.13	$ 18,764.38	$ 18,725.61	$ 8,025.79	$ 18,609.19	$ 8,263.5	$ 18,685.06	$ 18,567.43	$ 18,531.75	$ 8,185.56
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	10.47	8.77	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	5.28	7.04	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 9,440.93	$ 11,437.25	$ 9,440.93	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$ 3,150.	$.	$ 3,150.	$.	$.	$.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 550.	$.	$ 550.	$.	$.	$.	$ 550.	$.

LARGE Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,550.47	$ 23,588.98	$ 24,650.47	$ 23,768.41	$ 24,829.9	$ 24,100.47	$ 24,868.41	$ 24,138.98	$ 24,050.47	$ 24,400.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,372.81	$ 35,430.65	$ 37,025.01	$ 35,700.15	$ 37,294.51	$ 36,198.91	$ 37,352.35	$ 36,256.75	$ 36,123.81	$ 36,649.51
Net Present Value [$]	$ 8,025.79	$ 8,263.5	$ 6,382.03	$ 8,185.56	$ 6,311.14	$ 8,178.82	$ 6,564.37	$ 8,416.53	$ 8,175.28	$ 8,214.82
Incremental dollars per GHG saving	$ 1.56	$ 1.57	$ 1.58	$ 1.58	$ 1.59	$ 1.59	$ 1.59	$ 1.59	$ 1.6	$ 1.6
Auxiliary Energy Required Heating [GJ/yr]	138.4	138.8	138.4	138.4	138	138.4	138.3	138.8	137.1	138.4
Annual Energy DHW [GJ/yr]	27.2	27.2	16.2	27.1	16.2	25.4	16.2	25.4	27.2	24.2
Annual Energy Space Heating [GJ/yr]	76.7	77	76.4	76.6	76	76.7	76.3	77	76.2	76.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	133.4	133.7	122	133.3	121.7	131.6	122	131.9	132.9	130.5
Design Heating Load [W]	19530.7	19721.3	19032.2	19598.6	18909.6	19530.7	19100.2	19721.3	19482.6	19530.7
Annual Energy Electricity [kWh/yr]	29508.2	29585.3	29403.2	29486.9	29306	29508.2	29389.4	29585.3	29371.4	29508.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,112.1	$ 4,123.	$ 4,097.24	$ 4,109.08	$ 4,083.48	$ 4,112.1	$ 4,095.29	$ 4,123.	$ 4,092.74	$ 4,112.1
Annual Energy Natural Gas [m3/yr]	729.4	729.5	434.1	729	434.1	682	434.1	682.1	729.6	650.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.64	$ 314.68	$ 187.26	$ 314.47	$ 187.26	$ 294.19	$ 187.26	$ 294.23	$ 314.72	$ 280.6
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	141292	141094	141313	143020	143239	141293	143041	141095	141310	141294
Upgrade Package List	Pkg3221202033	Pkg3221201034	Pkg3221202034	Pkg3231201033	Pkg3231202033	Pkg3221202033	Pkg3231201034	Pkg3221201034	Pkg3221202034	Pkg3221202033
GHGI [kg/m2]	3.37	3.37	2.26	3.37	2.26	3.19	2.26	3.19	3.37	3.07
% ICC	2.1%	2.1%	2.2%	2.1%	2.2%	2.1%	2.2%	2.1%	2.1%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.3	75.4	75.2	75.2	75	75.3	75.2	75.4	74.5	75.3
Output: MEUI [kWh/(m2 * yr)]	58.4	58.6	52.2	58.3	52	57.4	52.2	57.6	58.1	56.8
Output: Better than ERS (%)	5250.0%	5240.0%	5540.0%	5250.0%	5550.0%	5310.0%	5540.0%	5300.0%	5260.0%	5350.0%
Output: Better than Envelope (%)	1830.0%	1800.0%	1830.0%	1830.0%	1850.0%	1830.0%	1830.0%	1800.0%	1900.0%	1830.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19945	20022	19840	19924	19743	19945	19826	20022	19808	19945
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,812.27	$ 2,823.14	$ 2,797.47	$ 2,809.27	$ 2,783.76	$ 2,812.27	$ 2,795.52	$ 2,823.14	$ 2,792.98	$ 2,812.27
Annual savings in carbon tax for electricity [$/year]	$ 9.97	$ 10.01	$ 9.92	$ 9.96	$ 9.87	$ 9.97	$ 9.91	$ 10.01	$ 9.9	$ 9.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,822.25	$ 2,833.16	$ 2,807.39	$ 2,819.23	$ 2,793.63	$ 2,822.25	$ 2,805.44	$ 2,833.16	$ 2,802.89	$ 2,822.25
Annual savings in GHG from electricity savings [kg CO2e/year]	219.4	220.2	218.2	219.2	217.2	219.4	218.1	220.2	217.9	219.4
Annual savings in natural gas [m3/year]	297.46	297.46	308.46	297.48	308.46	299.23	308.46	299.22	297.45	300.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,755.97	$ 2,755.94	$ 2,857.91	$ 2,756.11	$ 2,857.91	$ 2,772.33	$ 2,857.91	$ 2,772.3	$ 2,755.9	$ 2,783.21
Annual savings in carbon tax for natural gas [$/year]	$ 687.88	$ 687.87	$ 713.32	$ 687.91	$ 713.32	$ 691.96	$ 713.32	$ 691.95	$ 687.86	$ 694.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,443.85	$ 3,443.8	$ 3,571.23	$ 3,444.02	$ 3,571.23	$ 3,464.29	$ 3,571.23	$ 3,464.25	$ 3,443.76	$ 3,477.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	15286.2	15286	15851.6	15286.9	15851.6	15376.9	15851.6	15376.7	15285.8	15437.2
Net Present Value [$]	$ 8,025.79	$ 8,263.5	$ 6,382.03	$ 8,185.56	$ 6,311.14	$ 8,178.82	$ 6,564.37	$ 8,416.53	$ 8,175.28	$ 8,214.82
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.

LARGE Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,496.79	$ 23,546.79	$ 23,385.3	$ 23,676.22	$ 24,990.77	$ 23,846.79	$ 23,585.3	$ 23,714.73	$ 24,046.79	$ 23,885.3
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,292.18	$ 35,367.28	$ 35,124.72	$ 35,561.68	$ 37,536.14	$ 35,817.88	$ 35,425.12	$ 35,619.52	$ 36,118.28	$ 35,875.72
Net Present Value [$]	$ 18,764.38	$ 18,725.61	$ 18,708.13	$ 18,685.06	$ 18,668.96	$ 18,648.23	$ 18,609.19	$ 18,567.43	$ 18,549.05	$ 18,531.94
Incremental dollars per GHG saving	$ 2.63	$ 2.63	$ 2.63	$ 2.64	$ 2.71	$ 2.65	$ 2.64	$ 2.65	$ 2.67	$ 2.66
Auxiliary Energy Required Heating [GJ/yr]	129.6	131	132.6	129.2	124	131	131.3	129.6	129.7	131.3
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	16.2	16.2	13.7	14.7	16.2	14.7	13.7
Annual Energy Space Heating [GJ/yr]	137.3	138.7	140.5	136.9	131.3	138.7	139.1	137.2	137.3	139.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	180.9	180.8	181.5	180.5	174.9	179.8	181.1	180.8	179.4	180.1
Design Heating Load [W]	17991.4	18039.5	18278.2	17868.8	16848.4	18039.5	18230.1	18059.4	17991.4	18230.1
Annual Energy Electricity [kWh/yr]	8301.7	8308.7	8317.4	8299.6	8271.9	8308.8	8310.4	8301.3	8301.8	8310.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,111.38	$ 1,112.37	$ 1,113.6	$ 1,111.08	$ 1,107.16	$ 1,112.38	$ 1,112.61	$ 1,111.32	$ 1,111.39	$ 1,112.61
Annual Energy Natural Gas [m3/yr]	4055.3	4051.8	4070.5	4044	3897.5	4025.2	4060.6	4052.9	4015.3	4034
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,749.32	$ 1,747.81	$ 1,755.87	$ 1,744.44	$ 1,681.25	$ 1,736.33	$ 1,751.6	$ 1,748.28	$ 1,732.06	$ 1,740.13
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	149080	149063	148848	151006	156388	149064	148865	150808	149081	148866
Upgrade Package List	Pkg3321202034	Pkg3321202033	Pkg3321201033	Pkg3331202033	Pkg4321302033	Pkg3321202033	Pkg3321201034	Pkg3331201034	Pkg3321202034	Pkg3321201034
GHGI [kg/m2]	15.37	15.36	15.43	15.33	14.78	15.26	15.39	15.36	15.22	15.29
% ICC	2.1%	2.1%	2.1%	2.1%	2.2%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	70.5	71.2	72.1	70.3	67.4	71.2	71.4	70.4	70.5	71.4
Output: MEUI [kWh/(m2 * yr)]	84.4	84.4	84.8	84.2	81.2	83.8	84.5	84.4	83.6	84
Output: Better than ERS (%)	3610.0%	3620.0%	3590.0%	3630.0%	3830.0%	3650.0%	3610.0%	3620.0%	3670.0%	3640.0%
Output: Better than Envelope (%)	2340.0%	2260.0%	2170.0%	2370.0%	2680.0%	2260.0%	2240.0%	2340.0%	2340.0%	2240.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1261	1254	1246	1263	1291	1254	1253	1262	1261	1253
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 177.84	$ 176.86	$ 175.63	$ 178.14	$ 182.05	$ 176.84	$ 176.62	$ 177.9	$ 177.83	$ 176.62
Annual savings in carbon tax for electricity [$/year]	$ .63	$ .63	$ .62	$ .63	$ .65	$ .63	$ .63	$ .63	$ .63	$ .63
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 178.47	$ 177.48	$ 176.25	$ 178.77	$ 182.69	$ 177.47	$ 177.24	$ 178.53	$ 178.46	$ 177.24
Annual savings in GHG from electricity savings [kg CO2e/year]	13.9	13.8	13.7	13.9	14.2	13.8	13.8	13.9	13.9	13.8
Annual savings in natural gas [m3/year]	173.54	173.67	172.97	173.96	179.42	174.66	173.34	173.63	175.03	174.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,607.86	$ 1,609.06	$ 1,602.61	$ 1,611.76	$ 1,662.33	$ 1,618.25	$ 1,606.03	$ 1,608.68	$ 1,621.66	$ 1,615.21
Annual savings in carbon tax for natural gas [$/year]	$ 401.31	$ 401.61	$ 400.	$ 402.29	$ 414.91	$ 403.91	$ 400.86	$ 401.52	$ 404.76	$ 403.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,009.17	$ 2,010.68	$ 2,002.61	$ 2,014.04	$ 2,077.24	$ 2,022.15	$ 2,006.88	$ 2,010.2	$ 2,026.42	$ 2,018.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	8918.1	8924.8	8889	8939.7	9220.2	8975.7	8907.9	8922.7	8994.7	8958.9
Net Present Value [$]	$ 18,764.38	$ 18,725.61	$ 18,708.13	$ 18,685.06	$ 18,668.96	$ 18,648.23	$ 18,609.19	$ 18,567.43	$ 18,549.05	$ 18,531.94
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.

LARGE Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 39,644.57	$ 39,824.	$ 40,194.57	$ 40,283.56	$ 40,324.	$ 40,374.	$ 40,462.99	$ 40,475.79	$ 40,494.57	$ 40,674.
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 59,546.14	$ 59,815.65	$ 60,372.24	$ 60,505.91	$ 60,566.65	$ 60,641.75	$ 60,775.41	$ 60,794.64	$ 60,822.84	$ 61,092.35
Net Present Value [$]	$ 11,591.47	$ 11,518.28	$ 11,744.51	$ 12,230.46	$ 11,657.73	$ 11,671.31	$ 12,157.27	$ 12,018.27	$ 11,780.75	$ 11,706.59
Incremental dollars per GHG saving	$ 2.62	$ 2.63	$ 2.64	$ 2.66	$ 2.67	$ 2.65	$ 2.68	$ 2.68	$ 2.65	$ 2.66
Auxiliary Energy Required Heating [GJ/yr]	105.1	104.7	105.1	105.1	103.5	104.7	104.7	104.2	105.1	104.7
Annual Energy DHW [GJ/yr]	27.1	27.1	25.4	27.1	27.1	25.4	27.1	27.1	24.2	24.2
Annual Energy Space Heating [GJ/yr]	59	58.6	59	59	58.1	58.6	58.6	58.4	59	58.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	115.9	115.5	114.1	115.9	115	113.7	115.5	115.3	112.9	112.6
Design Heating Load [W]	15690.5	15567.8	15690.5	15690.5	15519.7	15567.8	15567.8	15598.3	15690.5	15567.8
Annual Energy Electricity [kWh/yr]	24643.7	24547.2	24643.7	24643.7	24406.5	24547.2	24547.2	24486.9	24643.7	24547.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,423.77	$ 3,410.11	$ 3,423.77	$ 3,423.77	$ 3,390.2	$ 3,410.11	$ 3,410.11	$ 3,401.58	$ 3,423.77	$ 3,410.11
Annual Energy Natural Gas [m3/yr]	728.8	728.3	681.4	728.8	728.5	680.9	728.3	728.7	649.9	649.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.38	$ 314.16	$ 293.93	$ 314.38	$ 314.25	$ 293.72	$ 314.16	$ 314.34	$ 280.34	$ 280.09
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156484	157042	156485	156772	157060	157043	157330	156610	156486	157044
Upgrade Package List	Pkg4321302054	Pkg4331302053	Pkg4321302054	Pkg4321402054	Pkg4331302054	Pkg4331302053	Pkg4331402053	Pkg4321303053	Pkg4321302054	Pkg4331302053
GHGI [kg/m2]	3.26	3.26	3.08	3.26	3.26	3.08	3.26	3.26	2.97	2.96
% ICC	3.5%	3.5%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	57.1	56.9	57.1	57.1	56.2	56.9	56.9	56.7	57.1	56.9
Output: MEUI [kWh/(m2 * yr)]	48.9	48.7	47.9	48.9	48.4	47.7	48.7	48.6	47.3	47.1
Output: Better than ERS (%)	5870.0%	5880.0%	5930.0%	5870.0%	5900.0%	5950.0%	5880.0%	5890.0%	5980.0%	5990.0%
Output: Better than Envelope (%)	3790.0%	3820.0%	3790.0%	3790.0%	3890.0%	3820.0%	3820.0%	3850.0%	3790.0%	3820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15081	14984	15081	15081	14844	14984	14984	14924	15081	14984
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,126.38	$ 2,112.77	$ 2,126.38	$ 2,126.38	$ 2,092.93	$ 2,112.77	$ 2,112.77	$ 2,104.27	$ 2,126.38	$ 2,112.77
Annual savings in carbon tax for electricity [$/year]	$ 7.54	$ 7.49	$ 7.54	$ 7.54	$ 7.42	$ 7.49	$ 7.49	$ 7.46	$ 7.54	$ 7.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,133.92	$ 2,120.26	$ 2,133.92	$ 2,133.92	$ 2,100.36	$ 2,120.26	$ 2,120.26	$ 2,111.73	$ 2,133.92	$ 2,120.26
Annual savings in GHG from electricity savings [kg CO2e/year]	165.9	164.8	165.9	165.9	163.3	164.8	164.8	164.2	165.9	164.8
Annual savings in natural gas [m3/year]	297.48	297.5	299.25	297.48	297.49	299.27	297.5	297.49	300.42	300.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,756.18	$ 2,756.35	$ 2,772.54	$ 2,756.18	$ 2,756.28	$ 2,772.71	$ 2,756.35	$ 2,756.21	$ 2,783.41	$ 2,783.62
Annual savings in carbon tax for natural gas [$/year]	$ 687.93	$ 687.97	$ 692.01	$ 687.93	$ 687.95	$ 692.06	$ 687.97	$ 687.94	$ 694.73	$ 694.78
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,444.11	$ 3,444.32	$ 3,464.55	$ 3,444.11	$ 3,444.24	$ 3,464.77	$ 3,444.32	$ 3,444.15	$ 3,478.14	$ 3,478.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	15287.3	15288.3	15378.1	15287.3	15287.9	15379	15288.3	15287.5	15438.4	15439.5
Net Present Value [$]	$ 11,591.47	$ 11,518.28	$ 11,744.51	$ 12,230.46	$ 11,657.73	$ 11,671.31	$ 12,157.27	$ 12,018.27	$ 11,780.75	$ 11,706.59
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	14.09	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$.	$.	$ 850.	$ 850.

LARGE Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 40,924.	$ 39,644.57	$ 41,474.	$ 39,824.	$ 41,774.	$ 40,194.57	$ 41,562.99	$ 41,575.79	$ 40,494.57	$ 40,374.
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 61,467.85	$ 59,546.14	$ 62,293.95	$ 59,815.65	$ 62,744.55	$ 60,372.24	$ 62,427.61	$ 62,446.84	$ 60,822.84	$ 60,641.75
Net Present Value [$]	$ 9,856.35	$ 11,591.47	$ 10,072.85	$ 11,518.28	$ 10,150.17	$ 11,744.51	$ 10,495.34	$ 10,376.14	$ 11,780.75	$ 11,671.31
Incremental dollars per GHG saving	$ 2.61	$ 2.62	$ 2.63	$ 2.63	$ 2.64	$ 2.64	$ 2.65	$ 2.65	$ 2.65	$ 2.65
Auxiliary Energy Required Heating [GJ/yr]	104.6	105.1	104.6	104.7	104.6	105.1	104.6	104.1	105.1	104.7
Annual Energy DHW [GJ/yr]	16.2	27.1	14.7	27.1	13.7	25.4	16.2	16.2	24.2	25.4
Annual Energy Space Heating [GJ/yr]	58.3	59	58.3	58.6	58.3	59	58.3	58.1	59	58.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	104.1	115.9	102.6	115.5	101.6	114.1	104.1	103.9	112.9	113.7
Design Heating Load [W]	15084.4	15690.5	15084.4	15567.8	15084.4	15690.5	15084.4	15114.9	15690.5	15567.8
Annual Energy Electricity [kWh/yr]	24431.6	24643.7	24433.4	24547.2	24434.5	24643.7	24431.6	24380.3	24643.7	24547.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,393.76	$ 3,423.77	$ 3,394.01	$ 3,410.11	$ 3,394.17	$ 3,423.77	$ 3,393.76	$ 3,386.5	$ 3,423.77	$ 3,410.11
Annual Energy Natural Gas [m3/yr]	434.1	728.8	393.7	728.3	366.8	681.4	434.1	434.1	649.9	680.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 314.38	$ 169.83	$ 314.16	$ 158.22	$ 293.93	$ 187.26	$ 187.26	$ 280.34	$ 293.72
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	157063	156484	157064	157042	157065	156485	157351	156631	156486	157043
Upgrade Package List	Pkg4331302054	Pkg4321302054	Pkg4331302054	Pkg4331302053	Pkg4331302054	Pkg4321302054	Pkg4331402054	Pkg4321303054	Pkg4321302054	Pkg4331302053
GHGI [kg/m2]	2.15	3.26	2	3.26	1.9	3.08	2.15	2.15	2.97	3.08
% ICC	3.6%	3.5%	3.7%	3.5%	3.7%	3.6%	3.7%	3.7%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.9	57.1	56.9	56.9	56.9	57.1	56.9	56.6	57.1	56.9
Output: MEUI [kWh/(m2 * yr)]	42.5	48.9	41.7	48.7	41.1	47.9	42.5	42.4	47.3	47.7
Output: Better than ERS (%)	6200.0%	5870.0%	6250.0%	5880.0%	6290.0%	5930.0%	6200.0%	6200.0%	5980.0%	5950.0%
Output: Better than Envelope (%)	3820.0%	3790.0%	3820.0%	3820.0%	3820.0%	3790.0%	3820.0%	3850.0%	3790.0%	3820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14869	15081	14870	14984	14872	15081	14869	14817	15081	14984
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,096.47	$ 2,126.38	$ 2,096.73	$ 2,112.77	$ 2,096.88	$ 2,126.38	$ 2,096.47	$ 2,089.24	$ 2,126.38	$ 2,112.77
Annual savings in carbon tax for electricity [$/year]	$ 7.43	$ 7.54	$ 7.44	$ 7.49	$ 7.44	$ 7.54	$ 7.43	$ 7.41	$ 7.54	$ 7.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,103.91	$ 2,133.92	$ 2,104.16	$ 2,120.26	$ 2,104.32	$ 2,133.92	$ 2,103.91	$ 2,096.65	$ 2,133.92	$ 2,120.26
Annual savings in GHG from electricity savings [kg CO2e/year]	163.6	165.9	163.6	164.8	163.6	165.9	163.6	163	165.9	164.8
Annual savings in natural gas [m3/year]	308.46	297.48	309.97	297.5	310.97	299.25	308.46	308.46	300.42	299.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,857.91	$ 2,756.18	$ 2,871.85	$ 2,756.35	$ 2,881.14	$ 2,772.54	$ 2,857.91	$ 2,857.91	$ 2,783.41	$ 2,772.71
Annual savings in carbon tax for natural gas [$/year]	$ 713.32	$ 687.93	$ 716.8	$ 687.97	$ 719.12	$ 692.01	$ 713.32	$ 713.32	$ 694.73	$ 692.06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,571.23	$ 3,444.11	$ 3,588.66	$ 3,444.32	$ 3,600.26	$ 3,464.55	$ 3,571.23	$ 3,571.23	$ 3,478.14	$ 3,464.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	15851.6	15287.3	15928.9	15288.3	15980.4	15378.1	15851.6	15851.6	15438.4	15379
Net Present Value [$]	$ 9,856.35	$ 11,591.47	$ 10,072.85	$ 11,518.28	$ 10,150.17	$ 11,744.51	$ 10,495.34	$ 10,376.14	$ 11,780.75	$ 11,671.31
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	14.09	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.

LARGE Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 40,924.	$ 41,474.	$ 41,774.	$ 41,755.22	$ 41,575.79	$ 42,255.22	$ 41,562.99	$ 42,305.22	$ 42,125.79	$ 42,605.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 61,467.85	$ 62,293.95	$ 62,744.55	$ 62,716.34	$ 62,446.84	$ 63,467.34	$ 62,427.61	$ 63,542.44	$ 63,272.94	$ 63,993.04
Net Present Value [$]	$ 9,856.35	$ 10,072.85	$ 10,150.17	$ 10,307.43	$ 10,376.14	$ 10,440.98	$ 10,495.34	$ 10,523.75	$ 10,592.45	$ 10,601.25
Incremental dollars per GHG saving	$ 2.61	$ 2.63	$ 2.64	$ 2.66	$ 2.65	$ 2.69	$ 2.65	$ 2.68	$ 2.67	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	104.6	104.6	104.6	103.7	104.1	102.4	104.6	103.7	104.1	103.7
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	16.2	16.2	16.2	16.2	14.7	14.7	13.7
Annual Energy Space Heating [GJ/yr]	58.3	58.3	58.3	57.8	58.1	57.3	58.3	57.8	58.2	57.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	104.1	102.6	101.6	103.6	103.9	103.1	104.1	102.1	102.4	101.1
Design Heating Load [W]	15084.4	15084.4	15084.4	14992.2	15114.9	14944.1	15084.4	14992.2	15114.9	14992.2
Annual Energy Electricity [kWh/yr]	24431.6	24433.4	24434.5	24283.9	24380.3	24141.6	24431.6	24285.7	24382.1	24286.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,393.76	$ 3,394.01	$ 3,394.17	$ 3,372.86	$ 3,386.5	$ 3,352.72	$ 3,393.76	$ 3,373.11	$ 3,386.75	$ 3,373.27
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	434.1	434.1	434.1	434.1	393.7	393.7	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 158.22
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	157063	157064	157065	157189	156631	157207	157351	157190	156632	157191
Upgrade Package List	Pkg4331302054	Pkg4331302054	Pkg4331302054	Pkg4331303053	Pkg4321303054	Pkg4331303054	Pkg4331402054	Pkg4331303053	Pkg4321303054	Pkg4331303053
GHGI [kg/m2]	2.15	2	1.9	2.15	2.15	2.15	2.15	2	2	1.9
% ICC	3.6%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.8%	3.7%	3.8%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.9	56.9	56.9	56.4	56.6	55.7	56.9	56.4	56.6	56.4
Output: MEUI [kWh/(m2 * yr)]	42.5	41.7	41.1	42.2	42.4	41.9	42.5	41.4	41.6	40.8
Output: Better than ERS (%)	6200.0%	6250.0%	6290.0%	6210.0%	6200.0%	6230.0%	6200.0%	6270.0%	6260.0%	6310.0%
Output: Better than Envelope (%)	3820.0%	3820.0%	3820.0%	3870.0%	3850.0%	3950.0%	3820.0%	3870.0%	3850.0%	3870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14869	14870	14872	14721	14817	14579	14869	14723	14819	14724
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,096.47	$ 2,096.73	$ 2,096.88	$ 2,075.65	$ 2,089.24	$ 2,055.58	$ 2,096.47	$ 2,075.9	$ 2,089.49	$ 2,076.06
Annual savings in carbon tax for electricity [$/year]	$ 7.43	$ 7.44	$ 7.44	$ 7.36	$ 7.41	$ 7.29	$ 7.43	$ 7.36	$ 7.41	$ 7.36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,103.91	$ 2,104.16	$ 2,104.32	$ 2,083.01	$ 2,096.65	$ 2,062.87	$ 2,103.91	$ 2,083.26	$ 2,096.9	$ 2,083.42
Annual savings in GHG from electricity savings [kg CO2e/year]	163.6	163.6	163.6	161.9	163	160.4	163.6	161.9	163	162
Annual savings in natural gas [m3/year]	308.46	309.97	310.97	308.46	308.46	308.46	308.46	309.97	309.97	310.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,857.91	$ 2,871.85	$ 2,881.14	$ 2,857.91	$ 2,857.91	$ 2,857.91	$ 2,857.91	$ 2,871.85	$ 2,871.85	$ 2,881.14
Annual savings in carbon tax for natural gas [$/year]	$ 713.32	$ 716.8	$ 719.12	$ 713.32	$ 713.32	$ 713.32	$ 713.32	$ 716.8	$ 716.8	$ 719.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,571.23	$ 3,588.66	$ 3,600.26	$ 3,571.23	$ 3,571.23	$ 3,571.23	$ 3,571.23	$ 3,588.66	$ 3,588.66	$ 3,600.26
Annual savings in GHG from natural gas savings [kg CO2e/year]	15851.6	15928.9	15980.4	15851.6	15851.6	15851.6	15851.6	15928.9	15928.9	15980.4
Net Present Value [$]	$ 9,856.35	$ 10,072.85	$ 10,150.17	$ 10,307.43	$ 10,376.14	$ 10,440.98	$ 10,495.34	$ 10,523.75	$ 10,592.45	$ 10,601.25
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	14.09	14.09	14.09	10.47	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 1,100.48	$ 2,431.7	$ 2,431.7	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.

LARGE Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,964.3	$ 12,052.81	$ 12,102.81	$ 12,182.24	$ 12,352.81	$ 12,514.3	$ 12,564.3	$ 12,643.73	$ 12,652.81	$ 12,732.24
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 17,970.38	$ 18,103.32	$ 18,178.42	$ 18,297.72	$ 18,553.92	$ 18,796.48	$ 18,871.58	$ 18,990.88	$ 19,004.52	$ 19,123.82
Net Present Value [$]	$ 22,187.57	$ 22,071.38	$ 23,869.7	$ 22,010.22	$ 22,045.33	$ 22,047.89	$ 23,845.11	$ 21,986.36	$ 23,665.53	$ 21,870.54
Incremental dollars per GHG saving	$ 1.7	$ 1.71	$ 1.62	$ 1.73	$ 1.74	$ 1.75	$ 1.66	$ 1.77	$ 1.68	$ 1.78
Auxiliary Energy Required Heating [GJ/yr]	197.6	199.3	200.2	197.4	199.3	197.6	198.5	195.6	200.2	197.4
Annual Energy DHW [GJ/yr]	27.5	25.7	16.5	27.5	24.5	25.7	16.5	27.5	14.9	25.7
Annual Energy Space Heating [GJ/yr]	209.3	211.1	212.1	209.1	211.1	209.3	210.2	207.2	212.1	209.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	263.6	263.6	255.4	263.4	262.4	261.7	253.5	261.5	253.8	261.6
Design Heating Load [W]	24697.2	24947.6	24454.3	24774.1	24947.6	24697.2	24203.9	24523.7	24454.3	24774.1
Annual Energy Electricity [kWh/yr]	8487.9	8497.3	8502	8487.1	8497.3	8487.9	8492.7	8477.8	8502.1	8487.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,137.72	$ 1,139.05	$ 1,139.72	$ 1,137.61	$ 1,139.05	$ 1,137.72	$ 1,138.4	$ 1,136.29	$ 1,139.73	$ 1,137.61
Annual Energy Natural Gas [m3/yr]	6257	6257.4	6035.3	6252.4	6224.7	6208	5986	6203	5994	6203.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,699.05	$ 2,699.22	$ 2,603.42	$ 2,697.07	$ 2,685.12	$ 2,677.91	$ 2,582.15	$ 2,675.76	$ 2,585.6	$ 2,675.93
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169831	169562	169564	171181	169563	169832	169834	171451	169565	171182
Upgrade Package List	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2131102031	Pkg2121101031	Pkg2131101031
GHGI [kg/m2]	23.63	23.63	22.8	23.61	23.51	23.44	22.61	23.43	22.64	23.43
% ICC	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	107.4	108.4	108.8	107.3	108.4	107.4	107.9	106.3	108.9	107.3
Output: MEUI [kWh/(m2 * yr)]	129.3	129.4	124.9	129.3	128.7	128.4	123.9	128.2	124.1	128.3
Output: Better than ERS (%)	2020.0%	2020.0%	2090.0%	2020.0%	2050.0%	2070.0%	2150.0%	2080.0%	2140.0%	2080.0%
Output: Better than Envelope (%)	100.0%	190.0%	240.0%	90.0%	190.0%	100.0%	150.0%	0.0%	240.0%	90.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1318	1308	1304	1319	1308	1318	1313	1328	1304	1319
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 185.81	$ 184.48	$ 183.82	$ 185.92	$ 184.48	$ 185.81	$ 185.13	$ 187.23	$ 183.81	$ 185.92
Annual savings in carbon tax for electricity [$/year]	$ .66	$ .65	$ .65	$ .66	$ .65	$ .66	$ .66	$ .66	$ .65	$ .66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 186.47	$ 185.14	$ 184.47	$ 186.58	$ 185.14	$ 186.47	$ 185.79	$ 187.9	$ 184.46	$ 186.58
Annual savings in GHG from electricity savings [kg CO2e/year]	14.5	14.4	14.3	14.5	14.4	14.5	14.4	14.6	14.3	14.5
Annual savings in natural gas [m3/year]	136.82	136.81	145.08	136.99	138.03	138.65	146.92	138.83	146.62	138.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,267.66	$ 1,267.52	$ 1,344.19	$ 1,269.25	$ 1,278.81	$ 1,284.57	$ 1,361.21	$ 1,286.3	$ 1,358.45	$ 1,286.16
Annual savings in carbon tax for natural gas [$/year]	$ 316.4	$ 316.37	$ 335.5	$ 316.8	$ 319.18	$ 320.62	$ 339.75	$ 321.05	$ 339.06	$ 321.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,584.06	$ 1,583.89	$ 1,679.69	$ 1,586.04	$ 1,597.99	$ 1,605.2	$ 1,700.96	$ 1,607.35	$ 1,697.51	$ 1,607.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	7031.1	7030.4	7455.6	7039.9	7093	7125	7550	7134.5	7534.7	7133.8
Net Present Value [$]	$ 22,187.57	$ 22,071.38	$ 23,869.7	$ 22,010.22	$ 22,045.33	$ 22,047.89	$ 23,845.11	$ 21,986.36	$ 23,665.53	$ 21,870.54
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 550.	$ 550.

LARGE Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,652.81	$ 15,252.81	$ 15,114.3	$ 15,202.81	$ 15,714.3	$ 15,802.81	$ 16,488.3	$ 15,332.24	$ 15,502.81	$ 16,576.81
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,008.52	$ 22,909.72	$ 22,701.68	$ 22,834.62	$ 23,602.88	$ 23,735.82	$ 24,765.43	$ 23,029.02	$ 23,285.22	$ 24,898.37
Net Present Value [$]	$ 22,477.51	$ 20,386.69	$ 22,215.6	$ 22,616.95	$ 20,146.5	$ 20,589.96	$ 27,053.17	$ 22,356.56	$ 22,643.25	$ 27,109.18
Incremental dollars per GHG saving	$ .85	$ .86	$ .88	$ .88	$ .88	$ .88	$ .89	$ .89	$ .89	$ .89
Auxiliary Energy Required Heating [GJ/yr]	198.9	199.7	197.1	198.9	198	199.7	205.6	197	198.9	206.9
Annual Energy DHW [GJ/yr]	27.5	16.5	27.5	25.7	16.5	14.9	9.5	27.5	24.5	8.7
Annual Energy Space Heating [GJ/yr]	125.7	125.5	124.7	125.7	124.6	125.5	128.8	124.6	125.7	129.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	181.4	170.1	180.4	179.6	169.1	168.5	166.4	180.3	178.4	166.3
Design Heating Load [W]	25052.2	24557.9	24801.7	25052.2	24307.5	24557.9	24801.7	24878.7	25052.2	25052.2
Annual Energy Electricity [kWh/yr]	42744.7	42665.5	42463.7	42744.7	42392.9	42667.2	46215.1	42435.1	42744.7	46202.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,985.06	$ 5,973.85	$ 5,945.3	$ 5,985.06	$ 5,935.28	$ 5,974.09	$ 6,476.12	$ 5,941.25	$ 5,985.06	$ 6,474.34
Annual Energy Natural Gas [m3/yr]	739.5	442.6	739.5	690.5	442.6	400.7	0	739.1	657.8	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.99	$ 190.92	$ 318.99	$ 297.86	$ 190.92	$ 172.85	$.	$ 318.82	$ 283.75	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	169570	169573	169840	169571	169843	169574	169846	171190	169572	169577
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121101031
GHGI [kg/m2]	3.69	2.58	3.68	3.51	2.57	2.42	0.99	3.68	3.38	0.99
% ICC	1.3%	1.4%	1.3%	1.3%	1.4%	1.4%	1.5%	1.4%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	108.1	108.6	107.1	108.1	107.6	108.6	111.8	107.1	108.1	112.5
Output: MEUI [kWh/(m2 * yr)]	84.6	78.4	84	83.6	77.9	77.6	76.4	84	82.9	76.4
Output: Better than ERS (%)	4300.0%	4530.0%	4330.0%	4350.0%	4560.0%	4580.0%	4680.0%	4330.0%	4390.0%	4680.0%
Output: Better than Envelope (%)	170.0%	210.0%	80.0%	170.0%	120.0%	210.0%	510.0%	70.0%	170.0%	580.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	32939	32860	32658	32939	32587	32862	36409	32629	32939	36397
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,644.4	$ 4,633.23	$ 4,604.78	$ 4,644.4	$ 4,594.8	$ 4,633.47	$ 5,133.73	$ 4,600.75	$ 4,644.4	$ 5,131.95
Annual savings in carbon tax for electricity [$/year]	$ 16.47	$ 16.43	$ 16.33	$ 16.47	$ 16.29	$ 16.43	$ 18.2	$ 16.31	$ 16.47	$ 18.2
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,660.87	$ 4,649.66	$ 4,621.11	$ 4,660.87	$ 4,611.09	$ 4,649.9	$ 5,151.93	$ 4,617.06	$ 4,660.87	$ 5,150.15
Annual savings in GHG from electricity savings [kg CO2e/year]	362.3	361.5	359.2	362.3	358.5	361.5	400.5	358.9	362.3	400.4
Annual savings in natural gas [m3/year]	342.4	353.46	342.4	344.22	353.46	355.02	369.95	342.41	345.44	369.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,172.32	$ 3,274.81	$ 3,172.32	$ 3,189.24	$ 3,274.81	$ 3,289.28	$ 3,427.6	$ 3,172.46	$ 3,200.52	$ 3,427.6
Annual savings in carbon tax for natural gas [$/year]	$ 791.8	$ 817.38	$ 791.8	$ 796.02	$ 817.38	$ 820.99	$ 855.51	$ 791.83	$ 798.84	$ 855.51
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,964.12	$ 4,092.19	$ 3,964.12	$ 3,985.25	$ 4,092.19	$ 4,110.26	$ 4,283.11	$ 3,964.29	$ 3,999.36	$ 4,283.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	17595.5	18163.9	17595.5	17689.3	18163.9	18244.2	19011.4	17596.2	17751.9	19011.4
Net Present Value [$]	$ 22,477.51	$ 20,386.69	$ 22,215.6	$ 22,616.95	$ 20,146.5	$ 20,589.96	$ 27,053.17	$ 22,356.56	$ 22,643.25	$ 27,109.18
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45	$ 6,446.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$ 1,374.	$.	$.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$ 850.	$ 550.

LARGE Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,097.29	$ 15,558.78	$ 16,897.29	$ 17,358.78	$ 15,647.29	$ 15,776.72	$ 16,108.78	$ 16,238.21	$ 15,947.29	$ 16,408.78
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,676.13	$ 23,369.29	$ 25,379.73	$ 26,072.89	$ 23,502.23	$ 23,696.63	$ 24,195.39	$ 24,389.79	$ 23,952.83	$ 24,645.99
Net Present Value [$]	$ 24,614.52	$ 24,591.03	$ 24,470.83	$ 24,447.34	$ 24,411.08	$ 24,410.28	$ 24,386.68	$ 24,384.97	$ 24,342.32	$ 24,317.74
Incremental dollars per GHG saving	$ 1.82	$ 1.86	$ 1.94	$ 1.97	$ 1.87	$ 1.88	$ 1.91	$ 1.92	$ 1.9	$ 1.93
Auxiliary Energy Required Heating [GJ/yr]	185.1	183.4	176.6	174.9	185.1	183.2	183.4	181.4	185.1	183.4
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	14.9	16.5	13.9	13.9
Annual Energy Space Heating [GJ/yr]	196.1	194.2	187.1	185.2	196.1	194.1	194.2	192.2	196.1	194.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	239.4	237.5	231	229.1	237.8	237.3	236	235.5	236.8	234.9
Design Heating Load [W]	23008.4	22757.9	21847.6	21597.1	23008.4	22834.9	22757.9	22584.4	23008.4	22757.9
Annual Energy Electricity [kWh/yr]	8422.2	8412.8	8550.3	8540.9	8422.3	8412	8412.9	8402.7	8422.3	8413
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,128.43	$ 1,127.1	$ 1,146.55	$ 1,145.22	$ 1,128.44	$ 1,126.98	$ 1,127.11	$ 1,125.67	$ 1,128.44	$ 1,127.12
Annual Energy Natural Gas [m3/yr]	5613.4	5564	5376.3	5326.9	5572	5559.8	5522.7	5510.6	5544.4	5495.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,421.43	$ 2,400.12	$ 2,319.15	$ 2,297.84	$ 2,403.57	$ 2,398.3	$ 2,382.3	$ 2,377.08	$ 2,391.66	$ 2,370.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	175936	176206	175972	176242	175937	179068	176207	179338	175938	176208
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101033	Pkg2221102033	Pkg2221101031	Pkg2231101031	Pkg2221102031	Pkg2231102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	21.21	21.03	20.33	20.14	21.06	21.01	20.87	20.83	20.96	20.77
% ICC	1.3%	1.4%	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	100.6	99.7	96	95.1	100.6	99.6	99.7	98.6	100.6	99.7
Output: MEUI [kWh/(m2 * yr)]	116.2	115.2	111.6	110.6	115.4	115.1	114.3	114.1	114.8	113.8
Output: Better than ERS (%)	2590.0%	2640.0%	2850.0%	2900.0%	2640.0%	2650.0%	2690.0%	2710.0%	2670.0%	2730.0%
Output: Better than Envelope (%)	540.0%	620.0%	970.0%	1060.0%	540.0%	630.0%	620.0%	730.0%	540.0%	620.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1384	1393	1255	1265	1383	1394	1393	1403	1383	1393
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 195.07	$ 196.4	$ 177.01	$ 178.34	$ 195.06	$ 196.51	$ 196.38	$ 197.82	$ 195.06	$ 196.37
Annual savings in carbon tax for electricity [$/year]	$ .69	$ .7	$ .63	$ .63	$ .69	$ .7	$ .7	$ .7	$ .69	$ .7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 195.77	$ 197.1	$ 177.64	$ 178.97	$ 195.75	$ 197.21	$ 197.08	$ 198.52	$ 195.75	$ 197.07
Annual savings in GHG from electricity savings [kg CO2e/year]	15.2	15.3	13.8	13.9	15.2	15.3	15.3	15.4	15.2	15.3
Annual savings in natural gas [m3/year]	160.8	162.64	169.64	171.48	162.34	162.8	164.18	164.63	163.37	165.21
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,489.83	$ 1,506.88	$ 1,571.68	$ 1,588.73	$ 1,504.12	$ 1,508.33	$ 1,521.14	$ 1,525.32	$ 1,513.65	$ 1,530.67
Annual savings in carbon tax for natural gas [$/year]	$ 371.85	$ 376.11	$ 392.28	$ 396.54	$ 375.42	$ 376.47	$ 379.67	$ 380.71	$ 377.8	$ 382.05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,861.69	$ 1,883.	$ 1,963.96	$ 1,985.27	$ 1,879.54	$ 1,884.81	$ 1,900.81	$ 1,906.03	$ 1,891.45	$ 1,912.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	8263.4	8358	8717.4	8812	8342.7	8366.1	8437.1	8460.3	8395.6	8489.9
Net Present Value [$]	$ 24,614.52	$ 24,591.03	$ 24,470.83	$ 24,447.34	$ 24,411.08	$ 24,410.28	$ 24,386.68	$ 24,384.97	$ 24,342.32	$ 24,317.74
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93	$ 9,440.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	HRV sre 75	HRV sre 75	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$ 1,800.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 850.

LARGE Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,535.3	$ 22,774.73	$ 22,945.3	$ 22,994.45	$ 22,996.79	$ 23,035.3	$ 23,085.3	$ 23,106.79	$ 23,214.73	$ 23,236.22
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,848.02	$ 34,207.64	$ 34,463.84	$ 34,537.66	$ 34,541.18	$ 34,599.02	$ 34,674.12	$ 34,706.4	$ 34,868.52	$ 34,900.8
Net Present Value [$]	$ 24,072.13	$ 23,605.61	$ 23,543.84	$ 23,617.29	$ 24,047.55	$ 23,876.23	$ 23,868.69	$ 23,588.37	$ 23,859.09	$ 23,580.47
Incremental dollars per GHG saving	$ 2.29	$ 2.32	$ 2.33	$ 2.33	$ 2.31	$ 2.32	$ 2.32	$ 2.34	$ 2.33	$ 2.35
Auxiliary Energy Required Heating [GJ/yr]	155.5	156.4	158.3	155.5	153.7	154.2	155.5	156.5	153.6	154.6
Annual Energy DHW [GJ/yr]	16.5	16.5	13.9	16.5	16.5	16.5	14.9	14.9	16.5	16.5
Annual Energy Space Heating [GJ/yr]	164.7	165.6	167.7	164.7	162.8	163.4	164.7	165.8	162.7	163.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	208.6	209.5	209	208.6	206.7	207.3	207	208.1	206.6	207.7
Design Heating Load [W]	19210.3	19272.3	19445.8	18654.7	18959.9	19159.8	19210.3	19195.4	19036.8	19021.9
Annual Energy Electricity [kWh/yr]	8438.4	8443.3	8453.4	8438.3	8429.1	8431.9	8438.5	8444	8428.4	8433.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,130.72	$ 1,131.41	$ 1,132.84	$ 1,130.7	$ 1,129.4	$ 1,129.8	$ 1,130.73	$ 1,131.51	$ 1,129.3	$ 1,130.08
Annual Energy Natural Gas [m3/yr]	4785.2	4810.8	4794.7	4784.7	4735.9	4750.9	4743.8	4773	4732.6	4761.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,064.17	$ 2,075.21	$ 2,068.27	$ 2,063.95	$ 2,042.9	$ 2,049.37	$ 2,046.31	$ 2,058.91	$ 2,041.48	$ 2,053.99
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	201550	203476	201534	207364	201766	201568	201551	201749	203494	203692
Upgrade Package List	Pkg3321201033	Pkg3331201032	Pkg3321201032	Pkg4221302033	Pkg3321201033	Pkg3321201034	Pkg3321201033	Pkg3321202032	Pkg3331201033	Pkg3331202032
GHGI [kg/m2]	18.11	18.21	18.15	18.11	17.93	17.98	17.96	18.07	17.91	18.02
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	84.5	85	86.1	84.5	83.6	83.8	84.5	85.1	83.5	84.1
Output: MEUI [kWh/(m2 * yr)]	99.5	100	99.7	99.4	98.4	98.7	98.6	99.2	98.4	99
Output: Better than ERS (%)	3540.0%	3510.0%	3530.0%	3540.0%	3600.0%	3580.0%	3590.0%	3560.0%	3600.0%	3570.0%
Output: Better than Envelope (%)	2050.0%	2000.0%	1910.0%	2050.0%	2140.0%	2120.0%	2050.0%	2000.0%	2150.0%	2100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1367	1362	1352	1367	1377	1374	1367	1362	1377	1372
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 192.79	$ 192.1	$ 190.67	$ 192.8	$ 194.1	$ 193.71	$ 192.78	$ 192.	$ 194.2	$ 193.42
Annual savings in carbon tax for electricity [$/year]	$ .68	$ .68	$ .68	$ .68	$ .69	$ .69	$ .68	$ .68	$ .69	$ .69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 193.47	$ 192.78	$ 191.35	$ 193.49	$ 194.79	$ 194.39	$ 193.46	$ 192.68	$ 194.89	$ 194.11
Annual savings in GHG from electricity savings [kg CO2e/year]	15	15	14.9	15	15.1	15.1	15	15	15.2	15.1
Annual savings in natural gas [m3/year]	191.66	190.71	191.31	191.68	193.5	192.94	193.2	192.11	193.62	192.54
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,775.73	$ 1,766.89	$ 1,772.45	$ 1,775.9	$ 1,792.75	$ 1,787.57	$ 1,790.02	$ 1,779.94	$ 1,793.89	$ 1,783.88
Annual savings in carbon tax for natural gas [$/year]	$ 443.21	$ 441.01	$ 442.39	$ 443.26	$ 447.46	$ 446.17	$ 446.78	$ 444.26	$ 447.75	$ 445.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,218.94	$ 2,207.9	$ 2,214.84	$ 2,219.16	$ 2,240.21	$ 2,233.74	$ 2,236.8	$ 2,224.2	$ 2,241.63	$ 2,229.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	9849.2	9800.2	9831	9850.1	9943.6	9914.9	9928.5	9872.5	9949.9	9894.4
Net Present Value [$]	$ 24,072.13	$ 23,605.61	$ 23,543.84	$ 23,617.29	$ 24,047.55	$ 23,876.23	$ 23,868.69	$ 23,588.37	$ 23,859.09	$ 23,580.47
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 9,440.93	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 850.	$.	$.	$.	$ 550.	$ 550.	$.	$.

LARGE Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,229.9	$ 25,245.3	$ 25,329.9	$ 24,645.3	$ 24,779.9	$ 24,729.9	$ 25,685.3	$ 25,795.3	$ 25,079.9	$ 25,706.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,393.31	$ 37,918.44	$ 38,045.51	$ 37,017.24	$ 37,219.41	$ 37,144.31	$ 38,579.32	$ 38,744.54	$ 37,670.01	$ 38,611.6
Net Present Value [$]	$ 15,998.8	$ 12,624.61	$ 14,130.82	$ 14,687.79	$ 16,138.49	$ 16,176.78	$ 11,916.33	$ 12,829.16	$ 16,165.51	$ 12,391.36
Incremental dollars per GHG saving	$ 1.4	$ 1.41	$ 1.42	$ 1.42	$ 1.43	$ 1.43	$ 1.44	$ 1.44	$ 1.44	$ 1.44
Auxiliary Energy Required Heating [GJ/yr]	160.9	157.9	160.5	157.1	160.9	159.7	155.1	157.9	160.9	156.1
Annual Energy DHW [GJ/yr]	27.5	16.5	16.5	27.6	25.7	27.6	16.5	14.9	24.5	16.5
Annual Energy Space Heating [GJ/yr]	102.6	99.9	101.9	100.2	102.6	102.1	98.3	99.9	102.6	99
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	159	145.2	147.2	156.6	157.1	158.5	143.6	143.7	155.9	144.3
Design Heating Load [W]	20370.6	19544.3	19828.5	20035.9	20370.6	20320.1	19308.8	19544.3	20370.6	19293.8
Annual Energy Electricity [kWh/yr]	36507.8	35769	36321.2	35835.9	36507.8	36382.1	35323	35771.2	36507.8	35499.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,102.54	$ 4,998.	$ 5,076.13	$ 5,007.46	$ 5,102.54	$ 5,084.75	$ 4,934.89	$ 4,998.31	$ 5,102.54	$ 4,959.82
Annual Energy Natural Gas [m3/yr]	739.6	442.6	442.6	740	690.6	739.8	442.6	400.7	658	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.04	$ 190.92	$ 190.92	$ 319.21	$ 297.9	$ 319.12	$ 190.92	$ 172.85	$ 283.84	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	195940	201541	195961	201538	195941	195958	201559	201542	195942	201757
Upgrade Package List	Pkg3231202033	Pkg3321201032	Pkg3321202034	Pkg3321201032	Pkg3231202033	Pkg3321202034	Pkg3321201033	Pkg3321201032	Pkg3321202033	Pkg3321202032
GHGI [kg/m2]	3.56	2.43	2.44	3.54	3.37	3.56	2.42	2.27	3.25	2.42
% ICC	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.2%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	87.5	85.8	87.2	85.4	87.5	86.8	84.3	85.8	87.5	84.9
Output: MEUI [kWh/(m2 * yr)]	72.4	64.9	66	71.1	71.4	72.1	64	64.1	70.7	64.4
Output: Better than ERS (%)	5000.0%	5330.0%	5260.0%	5080.0%	5060.0%	5020.0%	5380.0%	5370.0%	5100.0%	5360.0%
Output: Better than Envelope (%)	1770.0%	1930.0%	1790.0%	1970.0%	1770.0%	1840.0%	2070.0%	1930.0%	1770.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26702	25963	26516	26030	26702	26576	25517	25966	26702	25694
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,765.	$ 3,660.83	$ 3,738.69	$ 3,670.26	$ 3,765.	$ 3,747.27	$ 3,597.94	$ 3,661.14	$ 3,765.	$ 3,622.78
Annual savings in carbon tax for electricity [$/year]	$ 13.35	$ 12.98	$ 13.26	$ 13.02	$ 13.35	$ 13.29	$ 12.76	$ 12.98	$ 13.35	$ 12.85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,778.35	$ 3,673.81	$ 3,751.94	$ 3,683.27	$ 3,778.35	$ 3,760.56	$ 3,610.7	$ 3,674.12	$ 3,778.35	$ 3,635.63
Annual savings in GHG from electricity savings [kg CO2e/year]	293.7	285.6	291.7	286.3	293.7	292.3	280.7	285.6	293.7	282.6
Annual savings in natural gas [m3/year]	342.39	353.46	353.46	342.38	344.22	342.39	353.46	355.02	345.43	353.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,172.29	$ 3,274.81	$ 3,274.81	$ 3,172.15	$ 3,189.2	$ 3,172.22	$ 3,274.81	$ 3,289.28	$ 3,200.45	$ 3,274.81
Annual savings in carbon tax for natural gas [$/year]	$ 791.79	$ 817.38	$ 817.38	$ 791.75	$ 796.01	$ 791.77	$ 817.38	$ 820.99	$ 798.82	$ 817.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,964.07	$ 4,092.19	$ 4,092.19	$ 3,963.9	$ 3,985.21	$ 3,963.99	$ 4,092.19	$ 4,110.26	$ 3,999.27	$ 4,092.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	17595.3	18163.9	18163.9	17594.5	17689.1	17594.9	18163.9	18244.2	17751.5	18163.9
Net Present Value [$]	$ 15,998.8	$ 12,624.61	$ 14,130.82	$ 14,687.79	$ 16,138.49	$ 16,176.78	$ 11,916.33	$ 12,829.16	$ 16,165.51	$ 12,391.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	7.04	5.28	7.04	5.28	5.28	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 9,440.93	$ 11,437.25	$ 9,440.93	$ 11,437.25	$ 9,440.93	$ 9,440.93	$ 11,437.25	$ 11,437.25	$ 9,440.93	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.98	$ 494.55	$ 1,173.98	$ 494.55	$ 1,173.98	$ 1,173.98	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$ 600.	$ 600.	$.	$.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

LARGE Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,990.77	$ 22,535.3	$ 22,996.79	$ 25,490.77	$ 25,540.77	$ 25,670.2	$ 25,840.77	$ 23,035.3	$ 23,085.3	$ 23,214.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,536.14	$ 33,848.02	$ 34,541.18	$ 38,287.14	$ 38,362.24	$ 38,556.64	$ 38,812.84	$ 34,599.02	$ 34,674.12	$ 34,868.52
Net Present Value [$]	$ 24,152.35	$ 24,072.13	$ 24,047.55	$ 23,957.23	$ 23,948.72	$ 23,941.01	$ 23,879.24	$ 23,876.23	$ 23,868.69	$ 23,859.09
Incremental dollars per GHG saving	$ 2.4	$ 2.29	$ 2.31	$ 2.43	$ 2.43	$ 2.44	$ 2.45	$ 2.32	$ 2.32	$ 2.33
Auxiliary Energy Required Heating [GJ/yr]	145.2	155.5	153.7	144	145.2	143.3	145.3	154.2	155.5	153.6
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	13.9	16.5	14.9	16.5
Annual Energy Space Heating [GJ/yr]	153.8	164.7	162.8	152.5	153.8	151.8	153.9	163.4	164.7	162.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	197.7	208.6	206.7	196.4	196.2	195.7	195.2	207.3	207	206.6
Design Heating Load [W]	17660.6	19210.3	18959.9	17610.1	17660.6	17487.1	17660.6	19159.8	19210.3	19036.8
Annual Energy Electricity [kWh/yr]	8384.3	8438.4	8429.1	8377.8	8384.4	8374.3	8384.4	8431.9	8438.5	8428.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,123.06	$ 1,130.72	$ 1,129.4	$ 1,122.14	$ 1,123.08	$ 1,121.65	$ 1,123.08	$ 1,129.8	$ 1,130.73	$ 1,129.3
Annual Energy Natural Gas [m3/yr]	4499.1	4785.2	4735.9	4464.7	4457.7	4446.3	4430.2	4750.9	4743.8	4732.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,940.75	$ 2,064.17	$ 2,042.9	$ 1,925.92	$ 1,922.9	$ 1,917.98	$ 1,911.03	$ 2,049.37	$ 2,046.31	$ 2,041.48
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	209092	201550	201766	209110	209093	209668	209094	201568	201551	203494
Upgrade Package List	Pkg4321302033	Pkg3321201033	Pkg3321202033	Pkg4321302034	Pkg4321302033	Pkg4331302033	Pkg4321302033	Pkg3321201034	Pkg3321201033	Pkg3331201033
GHGI [kg/m2]	17.04	18.11	17.93	16.91	16.88	16.84	16.78	17.98	17.96	17.91
% ICC	2.2%	2.0%	2.0%	2.3%	2.3%	2.3%	2.3%	2.0%	2.0%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	78.9	84.5	83.6	78.3	79	77.9	79	83.8	84.5	83.5
Output: MEUI [kWh/(m2 * yr)]	93.6	99.5	98.4	92.8	92.7	92.5	92.2	98.7	98.6	98.4
Output: Better than ERS (%)	3880.0%	3540.0%	3600.0%	3920.0%	3920.0%	3940.0%	3950.0%	3580.0%	3590.0%	3600.0%
Output: Better than Envelope (%)	2580.0%	2050.0%	2140.0%	2640.0%	2580.0%	2670.0%	2570.0%	2120.0%	2050.0%	2150.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1421	1367	1377	1428	1421	1431	1421	1374	1367	1377
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 200.42	$ 192.79	$ 194.1	$ 201.33	$ 200.4	$ 201.83	$ 200.4	$ 193.71	$ 192.78	$ 194.2
Annual savings in carbon tax for electricity [$/year]	$ .71	$ .68	$ .69	$ .71	$ .71	$ .72	$ .71	$ .69	$ .68	$ .69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 201.13	$ 193.47	$ 194.79	$ 202.05	$ 201.11	$ 202.54	$ 201.11	$ 194.39	$ 193.46	$ 194.89
Annual savings in GHG from electricity savings [kg CO2e/year]	15.6	15	15.1	15.7	15.6	15.7	15.6	15.1	15	15.2
Annual savings in natural gas [m3/year]	202.32	191.66	193.5	203.6	203.86	204.29	204.89	192.94	193.2	193.62
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,874.49	$ 1,775.73	$ 1,792.75	$ 1,886.37	$ 1,888.78	$ 1,892.72	$ 1,898.28	$ 1,787.57	$ 1,790.02	$ 1,793.89
Annual savings in carbon tax for natural gas [$/year]	$ 467.86	$ 443.21	$ 447.46	$ 470.83	$ 471.43	$ 472.41	$ 473.8	$ 446.17	$ 446.78	$ 447.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,342.36	$ 2,218.94	$ 2,240.21	$ 2,357.19	$ 2,360.21	$ 2,365.13	$ 2,372.08	$ 2,233.74	$ 2,236.8	$ 2,241.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	10397	9849.2	9943.6	10462.8	10476.3	10498.1	10528.9	9914.9	9928.5	9949.9
Net Present Value [$]	$ 24,152.35	$ 24,072.13	$ 24,047.55	$ 23,957.23	$ 23,948.72	$ 23,941.01	$ 23,879.24	$ 23,876.23	$ 23,868.69	$ 23,859.09
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	10.47	10.47	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82	$ 2,672.82
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98	$ 494.55	$ 494.55	$ 494.55	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 3,141.69	$ 3,141.69	$ 3,141.69
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.

LARGE Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 43,256.89	$ 43,806.89	$ 43,895.88	$ 44,106.89	$ 44,445.88	$ 44,745.88	$ 48,397.71	$ 48,897.71	$ 48,947.71	$ 49,036.7
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 64,971.85	$ 65,797.95	$ 65,933.61	$ 66,248.55	$ 66,757.71	$ 67,208.31	$ 72,693.36	$ 73,444.36	$ 73,519.46	$ 73,653.12
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,645.33	$ 17,171.83	$ 17,784.77	$ 17,810.82	$ 20,920.08	$ 21,073.22	$ 21,059.52	$ 21,559.07
Incremental dollars per GHG saving	$ 2.49	$ 2.51	$ 2.53	$ 2.52	$ 2.54	$ 2.55	$ 2.78	$ 2.81	$ 2.8	$ 2.82
Auxiliary Energy Required Heating [GJ/yr]	119.3	119.3	119.3	119.3	119.3	119.3	119.1	117.9	119.1	119.1
Annual Energy DHW [GJ/yr]	27.6	25.7	27.6	24.5	25.7	24.5	27.6	27.6	25.7	27.6
Annual Energy Space Heating [GJ/yr]	77.4	77.4	77.4	77.4	77.4	77.4	76.2	75.7	76.2	76.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	133.8	132	133.8	130.7	132	130.7	132.1	131.6	130.2	132.1
Design Heating Load [W]	16024.5	16024.5	16024.5	16024.5	16024.5	16024.5	15340.9	15290.4	15340.9	15340.9
Annual Energy Electricity [kWh/yr]	29506.1	29506.1	29506.1	29506.1	29506.1	29506.1	29030.8	28895.4	29030.8	29030.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,044.54	$ 4,025.38	$ 4,044.54	$ 4,044.54
Annual Energy Natural Gas [m3/yr]	740.3	691.3	740.3	658.6	691.3	658.6	739.9	740.1	690.9	739.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.34	$ 298.2	$ 319.34	$ 284.1	$ 298.2	$ 284.1	$ 319.17	$ 319.25	$ 298.03	$ 319.17
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	210484	210485	210772	210486	210773	210774	209926	209944	209927	210214
Upgrade Package List	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4331303063	Pkg4331303064	Pkg4331303063	Pkg4331403063
GHGI [kg/m2]	3.41	3.23	3.41	3.1	3.23	3.1	3.4	3.4	3.21	3.4
% ICC	3.8%	3.9%	3.9%	3.9%	3.9%	4.0%	4.3%	4.3%	4.3%	4.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.1	64.8	64.8
Output: MEUI [kWh/(m2 * yr)]	58.7	57.7	58.7	57	57.7	57	57.8	57.5	56.8	57.8
Output: Better than ERS (%)	5790.0%	5850.0%	5790.0%	5890.0%	5850.0%	5890.0%	5850.0%	5860.0%	5910.0%	5850.0%
Output: Better than Envelope (%)	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3910.0%	3970.0%	3910.0%	3910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19700	19700	19700	19700	19700	19700	19225	19090	19225	19225
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,710.74	$ 2,691.65	$ 2,710.74	$ 2,710.74
Annual savings in carbon tax for electricity [$/year]	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.61	$ 9.54	$ 9.61	$ 9.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,720.35	$ 2,701.19	$ 2,720.35	$ 2,720.35
Annual savings in GHG from electricity savings [kg CO2e/year]	216.7	216.7	216.7	216.7	216.7	216.7	211.5	210	211.5	211.5
Annual savings in natural gas [m3/year]	342.37	344.19	342.37	345.41	344.19	345.41	342.38	342.38	344.21	342.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,172.04	$ 3,188.96	$ 3,172.04	$ 3,200.25	$ 3,188.96	$ 3,200.25	$ 3,172.18	$ 3,172.11	$ 3,189.1	$ 3,172.18
Annual savings in carbon tax for natural gas [$/year]	$ 791.73	$ 795.95	$ 791.73	$ 798.77	$ 795.95	$ 798.77	$ 791.76	$ 791.74	$ 795.98	$ 791.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,963.77	$ 3,984.91	$ 3,963.77	$ 3,999.01	$ 3,984.91	$ 3,999.01	$ 3,963.94	$ 3,963.86	$ 3,985.08	$ 3,963.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	17593.9	17687.8	17593.9	17750.4	17687.8	17750.4	17594.7	17594.3	17688.5	17594.7
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,645.33	$ 17,171.83	$ 17,784.77	$ 17,810.82	$ 20,920.08	$ 21,073.22	$ 21,059.52	$ 21,559.07
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 21,519.11	$ 21,519.11	$ 21,519.11	$ 21,519.11
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$ 550.	$.

LARGE Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 43,256.89	$ 43,806.89	$ 44,106.89	$ 43,895.88	$ 44,445.88	$ 44,745.88	$ 49,497.71	$ 50,047.71	$ 50,347.71	$ 48,397.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 64,971.85	$ 65,797.95	$ 66,248.55	$ 65,931.61	$ 66,757.71	$ 67,208.31	$ 74,345.56	$ 75,171.66	$ 75,622.26	$ 72,693.36
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,171.83	$ 17,645.33	$ 17,784.77	$ 17,810.82	$ 19,092.88	$ 19,297.43	$ 19,368.56	$ 20,920.08
Incremental dollars per GHG saving	$ 2.49	$ 2.51	$ 2.52	$ 2.53	$ 2.54	$ 2.55	$ 2.76	$ 2.78	$ 2.78	$ 2.78
Auxiliary Energy Required Heating [GJ/yr]	119.3	119.3	119.3	119.3	119.3	119.3	118.9	118.9	118.9	119.1
Annual Energy DHW [GJ/yr]	27.6	25.7	24.5	27.6	25.7	24.5	16.5	14.9	13.9	27.6
Annual Energy Space Heating [GJ/yr]	77.4	77.4	77.4	77.4	77.4	77.4	75.6	75.6	75.6	76.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	133.8	132	130.7	133.8	132	130.7	120.4	118.8	117.8	132.1
Design Heating Load [W]	16024.5	16024.5	16024.5	16024.5	16024.5	16024.5	14814.9	14814.9	14814.9	15340.9
Annual Energy Electricity [kWh/yr]	29506.1	29506.1	29506.1	29506.1	29506.1	29506.1	28861.1	28863.3	28864.8	29030.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,020.53	$ 4,020.84	$ 4,021.05	$ 4,044.54
Annual Energy Natural Gas [m3/yr]	740.3	691.3	658.6	740.3	691.3	658.6	442.6	400.7	372.9	739.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.34	$ 298.2	$ 284.1	$ 319.34	$ 298.2	$ 284.1	$ 190.92	$ 172.85	$ 160.86	$ 319.17
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	210484	210485	210486	210772	210773	210774	209947	209948	209949	209926
Upgrade Package List	Pkg4341303054	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4341403054	Pkg4331303064	Pkg4331303064	Pkg4331303064	Pkg4331303063
GHGI [kg/m2]	3.41	3.23	3.1	3.41	3.23	3.1	2.28	2.12	2.02	3.4
% ICC	3.8%	3.9%	3.9%	3.9%	3.9%	4.0%	4.4%	4.4%	4.5%	4.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.8	64.8	64.6	64.6	64.6	64.8
Output: MEUI [kWh/(m2 * yr)]	58.7	57.7	57	58.7	57.7	57	51.4	50.6	50	57.8
Output: Better than ERS (%)	5790.0%	5850.0%	5890.0%	5790.0%	5850.0%	5890.0%	6120.0%	6180.0%	6210.0%	5850.0%
Output: Better than Envelope (%)	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3920.0%	3920.0%	3920.0%	3910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19700	19700	19700	19700	19700	19700	19055	19058	19059	19225
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,686.81	$ 2,687.12	$ 2,687.33	$ 2,710.74
Annual savings in carbon tax for electricity [$/year]	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.53	$ 9.53	$ 9.53	$ 9.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,696.34	$ 2,696.65	$ 2,696.86	$ 2,720.35
Annual savings in GHG from electricity savings [kg CO2e/year]	216.7	216.7	216.7	216.7	216.7	216.7	209.6	209.6	209.7	211.5
Annual savings in natural gas [m3/year]	342.37	344.19	345.41	342.37	344.19	345.41	353.46	355.02	356.06	342.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,172.04	$ 3,188.96	$ 3,200.25	$ 3,172.04	$ 3,188.96	$ 3,200.25	$ 3,274.81	$ 3,289.28	$ 3,298.87	$ 3,172.18
Annual savings in carbon tax for natural gas [$/year]	$ 791.73	$ 795.95	$ 798.77	$ 791.73	$ 795.95	$ 798.77	$ 817.38	$ 820.99	$ 823.38	$ 791.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,963.77	$ 3,984.91	$ 3,999.01	$ 3,963.77	$ 3,984.91	$ 3,999.01	$ 4,092.19	$ 4,110.26	$ 4,122.25	$ 3,963.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	17593.9	17687.8	17750.4	17593.9	17687.8	17750.4	18163.9	18244.2	18297.4	17594.7
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,171.83	$ 17,645.33	$ 17,784.77	$ 17,810.82	$ 19,092.88	$ 19,297.43	$ 19,368.56	$ 20,920.08
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 21,519.11	$ 21,519.11	$ 21,519.11	$ 21,519.11
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,135.67
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.

LARGE Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k	large.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 43,256.89	$ 43,806.89	$ 44,106.89	$ 43,895.88	$ 44,445.88	$ 44,745.88	$ 49,497.71	$ 50,047.71	$ 50,347.71	$ 50,136.7
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 64,971.85	$ 65,797.95	$ 66,248.55	$ 65,931.61	$ 66,757.71	$ 67,208.31	$ 74,345.56	$ 75,171.66	$ 75,622.26	$ 75,305.32
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,171.83	$ 17,645.33	$ 17,784.77	$ 17,810.82	$ 19,092.88	$ 19,297.43	$ 19,368.56	$ 19,731.87
Incremental dollars per GHG saving	$ 2.49	$ 2.51	$ 2.52	$ 2.53	$ 2.54	$ 2.55	$ 2.76	$ 2.78	$ 2.78	$ 2.79
Auxiliary Energy Required Heating [GJ/yr]	119.3	119.3	119.3	119.3	119.3	119.3	118.9	118.9	118.9	118.9
Annual Energy DHW [GJ/yr]	27.6	25.7	24.5	27.6	25.7	24.5	16.5	14.9	13.9	16.5
Annual Energy Space Heating [GJ/yr]	77.4	77.4	77.4	77.4	77.4	77.4	75.6	75.6	75.6	75.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	133.8	132	130.7	133.8	132	130.7	120.4	118.8	117.8	120.4
Design Heating Load [W]	16024.5	16024.5	16024.5	16024.5	16024.5	16024.5	14814.9	14814.9	14814.9	14814.9
Annual Energy Electricity [kWh/yr]	29506.1	29506.1	29506.1	29506.1	29506.1	29506.1	28861.1	28863.3	28864.8	28861.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,111.8	$ 4,020.53	$ 4,020.84	$ 4,021.05	$ 4,020.53
Annual Energy Natural Gas [m3/yr]	740.3	691.3	658.6	740.3	691.3	658.6	442.6	400.7	372.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.34	$ 298.2	$ 284.1	$ 319.34	$ 298.2	$ 284.1	$ 190.92	$ 172.85	$ 160.86	$ 190.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	210484	210485	210486	210772	210773	210774	209947	209948	209949	210235
Upgrade Package List	Pkg4341303054	Pkg4341303054	Pkg4341303054	Pkg4341403054	Pkg4341403054	Pkg4341403054	Pkg4331303064	Pkg4331303064	Pkg4331303064	Pkg4331403064
GHGI [kg/m2]	3.41	3.23	3.1	3.41	3.23	3.1	2.28	2.12	2.02	2.28
% ICC	3.8%	3.9%	3.9%	3.9%	3.9%	4.0%	4.4%	4.4%	4.5%	4.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	64.8	64.8	64.8	64.8	64.8	64.6	64.6	64.6	64.6
Output: MEUI [kWh/(m2 * yr)]	58.7	57.7	57	58.7	57.7	57	51.4	50.6	50	51.4
Output: Better than ERS (%)	5790.0%	5850.0%	5890.0%	5790.0%	5850.0%	5890.0%	6120.0%	6180.0%	6210.0%	6120.0%
Output: Better than Envelope (%)	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3900.0%	3920.0%	3920.0%	3920.0%	3920.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19700	19700	19700	19700	19700	19700	19055	19058	19059	19055
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,777.76	$ 2,686.81	$ 2,687.12	$ 2,687.33	$ 2,686.81
Annual savings in carbon tax for electricity [$/year]	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.85	$ 9.53	$ 9.53	$ 9.53	$ 9.53
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,787.61	$ 2,696.34	$ 2,696.65	$ 2,696.86	$ 2,696.34
Annual savings in GHG from electricity savings [kg CO2e/year]	216.7	216.7	216.7	216.7	216.7	216.7	209.6	209.6	209.7	209.6
Annual savings in natural gas [m3/year]	342.37	344.19	345.41	342.37	344.19	345.41	353.46	355.02	356.06	353.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,172.04	$ 3,188.96	$ 3,200.25	$ 3,172.04	$ 3,188.96	$ 3,200.25	$ 3,274.81	$ 3,289.28	$ 3,298.87	$ 3,274.81
Annual savings in carbon tax for natural gas [$/year]	$ 791.73	$ 795.95	$ 798.77	$ 791.73	$ 795.95	$ 798.77	$ 817.38	$ 820.99	$ 823.38	$ 817.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,963.77	$ 3,984.91	$ 3,999.01	$ 3,963.77	$ 3,984.91	$ 3,999.01	$ 4,092.19	$ 4,110.26	$ 4,122.25	$ 4,092.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	17593.9	17687.8	17750.4	17593.9	17687.8	17750.4	18163.9	18244.2	18297.4	18163.9
Net Present Value [$]	$ 17,006.34	$ 17,145.78	$ 17,171.83	$ 17,645.33	$ 17,784.77	$ 17,810.82	$ 19,092.88	$ 19,297.43	$ 19,368.56	$ 19,731.87
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7	$ 2,431.7
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 14,276.62	$ 21,519.11	$ 21,519.11	$ 21,519.11	$ 21,519.11
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25	$ 11,437.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 2,775.65	$ 1,173.98	$ 1,173.98	$ 1,173.98	$ 1,173.98
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66	$ 4,774.66	$ 4,774.66	$ 4,135.67	$ 4,135.67	$ 4,135.67	$ 4,774.66
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.

LARGE 018WWR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,571.73	$ 12,033.23	$ 12,071.73	$ 12,121.73	$ 12,171.73	$ 12,251.02	$ 12,421.73	$ 12,424.79	$ 12,533.23	$ 12,583.23
ICC with multiplier (Van=1.0,this Cz =1)	$ 11,571.73	$ 12,033.23	$ 12,071.73	$ 12,121.73	$ 12,171.73	$ 12,251.02	$ 12,421.73	$ 12,424.79	$ 12,533.23	$ 12,583.23
Net Present Value [$]	$ 510.09	$ 209.98	$ 1,151.58	$ 245.93	$ 1,588.3	$ 40.85	$ 130.1	$ 726.11	$ 850.87	$ 53.7
Incremental dollars per GHG saving	$ 5.05	$ 5.18	$ 4.76	$ 5.15	$ 4.54	$ 5.25	$ 5.18	$ 5.63	$ 4.87	$ 5.26
Auxiliary Energy Required Heating [GJ/yr]	60.6	59.9	56	60.6	63.1	59.7	60.6	62.1	55.3	59.9
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	13.5	23.7	21.7	23.7	23.8	22.5
Annual Energy Space Heating [GJ/yr]	64.2	63.5	59.3	64.2	66.9	63.3	64.2	65.8	58.6	63.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	114.7	114	109.8	113.4	107.1	113.8	112.6	116.3	109.1	112.7
Design Heating Load [W]	12159.1	12045.6	11350.5	12159.1	12036.4	12063.5	12159.1	11350.5	11237	12045.6
Annual Energy Electricity [kWh/yr]	7747.7	7744.3	7723.4	7747.7	7761.2	7743.3	7747.7	7756	7719.9	7744.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,032.98	$ 1,032.5	$ 1,029.55	$ 1,032.98	$ 1,034.89	$ 1,032.36	$ 1,032.98	$ 1,034.16	$ 1,029.05	$ 1,032.5
Annual Energy Natural Gas [m3/yr]	2329.8	2311.6	2201	2295.7	2125.3	2306.1	2273.7	2373	2182.9	2277.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,004.99	$ 997.14	$ 949.43	$ 990.28	$ 916.78	$ 994.77	$ 980.79	$ 1,023.63	$ 941.63	$ 982.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1729	1999	11449	1730	1732	3349	1731	11395	11719	2000
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1131101031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg1121102031
GHGI [kg/m2]	8.9	8.83	8.41	8.77	8.13	8.81	8.69	9.06	8.35	8.7
% ICC	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	32.9	32.6	30.4	32.9	34.3	32.5	32.9	33.8	30.1	32.6
Output: MEUI [kWh/(m2 * yr)]	48.4	48	45.7	47.7	44.3	47.9	47.3	49.3	45.4	47.3
Output: Better than ERS (%)	900.0%	960.0%	1290.0%	1010.0%	1140.0%	980.0%	1070.0%	780.0%	1350.0%	1060.0%
Output: Better than Envelope (%)	190.0%	310.0%	940.0%	190.0%	210.0%	340.0%	190.0%	50.0%	1050.0%	310.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	816	819	840	816	802	820	816	808	844	819
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 115.06	$ 115.54	$ 118.48	$ 115.06	$ 113.15	$ 115.68	$ 115.06	$ 113.89	$ 118.98	$ 115.54
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .42	$ .41	$ .4	$ .41	$ .41	$ .4	$ .42	$ .41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 115.46	$ 115.95	$ 118.9	$ 115.46	$ 113.55	$ 116.09	$ 115.46	$ 114.29	$ 119.4	$ 115.95
Annual savings in GHG from electricity savings [kg CO2e/year]	9	9	9.2	9	8.8	9	9	8.9	9.3	9
Annual savings in natural gas [m3/year]	44.4	45.08	49.2	45.67	52.02	45.28	46.49	42.79	49.87	46.35
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 411.34	$ 417.63	$ 455.81	$ 423.12	$ 481.94	$ 419.53	$ 430.71	$ 396.43	$ 462.06	$ 429.43
Annual savings in carbon tax for natural gas [$/year]	$ 102.67	$ 104.24	$ 113.77	$ 105.61	$ 120.29	$ 104.71	$ 107.5	$ 98.95	$ 115.33	$ 107.18
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 514.01	$ 521.87	$ 569.57	$ 528.72	$ 602.23	$ 524.24	$ 538.21	$ 495.38	$ 577.38	$ 536.62
Annual savings in GHG from natural gas savings [kg CO2e/year]	2281.5	2316.4	2528.2	2346.8	2673.1	2326.9	2389	2198.8	2562.8	2381.9
Net Present Value [$]	$ 510.09	$ 209.98	$ 1,151.58	$ 245.93	$ 1,588.3	$ 40.85	$ 130.1	$ 726.11	$ 850.87	$ 53.7
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 4,001.26	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 850.	$.	$.	$ 550.

LARGE 018WWR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,095.73	$ 16,557.23	$ 16,595.73	$ 16,645.73	$ 16,775.02	$ 16,945.73	$ 15,321.73	$ 17,057.23	$ 17,107.23	$ 17,145.73
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,095.73	$ 16,557.23	$ 16,595.73	$ 16,645.73	$ 16,775.02	$ 16,945.73	$ 15,321.73	$ 17,057.23	$ 17,107.23	$ 17,145.73
Net Present Value [$]	$ 6,839.41	$ 7,185.15	$ 6,080.31	$ 6,932.95	$ 7,327.54	$ 6,939.72	$ 2,710.57	$ 6,498.9	$ 7,278.69	$ 6,174.21
Incremental dollars per GHG saving	$ 2.42	$ 2.49	$ 2.49	$ 2.5	$ 2.52	$ 2.55	$ 2.56	$ 2.56	$ 2.57	$ 2.57
Auxiliary Energy Required Heating [GJ/yr]	66.5	65.9	61.9	66.3	65.7	66.1	63	61.2	65.6	61.6
Annual Energy DHW [GJ/yr]	7.8	7.8	7.8	7.3	7.8	6.9	13.5	7.8	7.3	7.3
Annual Energy Space Heating [GJ/yr]	23.4	23.2	21.6	23.3	23.1	23.2	22.3	21.6	23.1	21.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	59.1	59	57.4	58.5	58.9	58.1	63.7	57.3	58.3	56.7
Design Heating Load [W]	12205.9	12092.4	11394.3	12205.9	12110.3	12205.9	12082.8	11280.9	12092.4	11394.3
Annual Energy Electricity [kWh/yr]	16425.5	16380.5	15936.4	16248.2	16351.2	16134.3	13944.2	15919.7	16203.2	15759.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,260.89	$ 2,254.53	$ 2,191.69	$ 2,235.81	$ 2,250.38	$ 2,219.69	$ 1,909.79	$ 2,189.32	$ 2,229.44	$ 2,166.61
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	362.1	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$ 156.2	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1744	2014	11464	1745	3364	1746	1741	11734	2015	11465
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1131101031	Pkg1121101031	Pkg1121101031	Pkg2121102031	Pkg1121102031	Pkg2121101031
GHGI [kg/m2]	0.35	0.34	0.35	0.35	0.35	0.35	1.66	0.34	0.35	0.34
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	36.2	35.8	33.6	36	35.7	35.9	34.3	33.3	35.7	33.5
Output: MEUI [kWh/(m2 * yr)]	18.1	18	17.2	17.8	18	17.6	20.6	17.1	17.7	16.8
Output: Better than ERS (%)	5100.0%	5110.0%	5240.0%	5150.0%	5120.0%	5180.0%	4730.0%	5250.0%	5170.0%	5300.0%
Output: Better than Envelope (%)	760.0%	660.0%	20.0%	730.0%	630.0%	700.0%	190.0%	100.0%	610.0%	30.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7862	7817	7373	7684	7788	7571	5380	7356	7640	7196
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,108.51	$ 1,102.17	$ 1,039.55	$ 1,083.51	$ 1,098.04	$ 1,067.45	$ 758.65	$ 1,037.2	$ 1,077.17	$ 1,014.57
Annual savings in carbon tax for electricity [$/year]	$ 3.93	$ 3.91	$ 3.69	$ 3.84	$ 3.89	$ 3.79	$ 2.69	$ 3.68	$ 3.82	$ 3.6
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,112.44	$ 1,106.08	$ 1,043.24	$ 1,087.36	$ 1,101.93	$ 1,071.24	$ 761.34	$ 1,040.87	$ 1,080.99	$ 1,018.16
Annual savings in GHG from electricity savings [kg CO2e/year]	86.5	86	81.1	84.5	85.7	83.3	59.2	80.9	84	79.2
Annual savings in natural gas [m3/year]	131.2	131.2	131.2	131.2	131.2	131.2	117.71	131.2	131.2	131.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,215.6	$ 1,215.6	$ 1,215.6	$ 1,215.6	$ 1,215.6	$ 1,215.6	$ 1,090.6	$ 1,215.6	$ 1,215.6	$ 1,215.6
Annual savings in carbon tax for natural gas [$/year]	$ 303.41	$ 303.41	$ 303.41	$ 303.41	$ 303.41	$ 303.41	$ 272.21	$ 303.41	$ 303.41	$ 303.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,519.01	$ 1,519.01	$ 1,519.01	$ 1,519.01	$ 1,519.01	$ 1,519.01	$ 1,362.81	$ 1,519.01	$ 1,519.01	$ 1,519.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	6742.4	6742.4	6742.4	6742.4	6742.4	6742.4	6049.1	6742.4	6742.4	6742.4
Net Present Value [$]	$ 6,839.41	$ 7,185.15	$ 6,080.31	$ 6,932.95	$ 7,327.54	$ 6,939.72	$ 2,710.57	$ 6,498.9	$ 7,278.69	$ 6,174.21
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 550.

LARGE 018WWR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 13,521.73	$ 13,351.02	$ 13,683.23	$ 12,171.73	$ 13,983.23	$ 13,812.52	$ 13,901.02
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 13,521.73	$ 13,351.02	$ 13,683.23	$ 12,171.73	$ 13,983.23	$ 13,812.52	$ 13,901.02
Net Present Value [$]	$ 2,232.71	$ 1,934.29	$ 1,924.5	$ 1,779.55	$ 1,760.79	$ 1,626.21	$ 1,588.3	$ 1,481.26	$ 1,461.41	$ 1,451.62
Incremental dollars per GHG saving	$ 4.33	$ 4.43	$ 4.43	$ 4.48	$ 4.49	$ 4.53	$ 4.54	$ 4.58	$ 4.59	$ 4.59
Auxiliary Energy Required Heating [GJ/yr]	58.5	57.8	58.5	58.5	57.7	57.9	63.1	57.9	57	57.7
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	11.7	13.5	12.4	13.5	11.7	13.5	12.4
Annual Energy Space Heating [GJ/yr]	62	61.3	62	62	61.1	61.3	66.9	61.3	60.4	61.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	102.2	101.5	101.1	100.4	101.3	100.4	107.1	99.7	100.6	100.2
Design Heating Load [W]	11228.5	11115	11228.5	11228.5	11132.9	11115	12036.4	11115	11019.4	11132.9
Annual Energy Electricity [kWh/yr]	7736.7	7733.3	7736.8	7736.8	7732.3	7733.3	7761.2	7733.3	7728.9	7732.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,031.43	$ 1,030.95	$ 1,031.44	$ 1,031.44	$ 1,030.81	$ 1,030.95	$ 1,034.89	$ 1,030.95	$ 1,030.32	$ 1,030.82
Annual Energy Natural Gas [m3/yr]	1996.2	1977.8	1967.3	1948.8	1972.8	1948.9	2125.3	1930.4	1954.5	1944
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 861.09	$ 853.15	$ 848.62	$ 840.64	$ 851.	$ 840.69	$ 916.78	$ 832.71	$ 843.1	$ 838.57
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	11454	13072	11723	1732	11724	13342	13073
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg1121101031	Pkg2121102031	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	7.65	7.58	7.54	7.47	7.56	7.47	8.13	7.4	7.49	7.45
% ICC	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.8	31.4	31.8	31.8	31.3	31.4	34.3	31.5	31	31.4
Output: MEUI [kWh/(m2 * yr)]	41.6	41.2	41	40.7	41.1	40.7	44.3	40.3	40.8	40.6
Output: Better than ERS (%)	1550.0%	1600.0%	1640.0%	1700.0%	1620.0%	1700.0%	1140.0%	1750.0%	1680.0%	1710.0%
Output: Better than Envelope (%)	530.0%	650.0%	530.0%	530.0%	660.0%	630.0%	210.0%	630.0%	780.0%	660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	827	830	827	827	831	830	802	830	835	831
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 116.61	$ 117.09	$ 116.59	$ 116.59	$ 117.23	$ 117.09	$ 113.15	$ 117.09	$ 117.71	$ 117.21
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .42	$ .41	$ .41	$ .42	$ .42	$ .4	$ .42	$ .42	$ .42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 117.02	$ 117.5	$ 117.01	$ 117.01	$ 117.64	$ 117.5	$ 113.55	$ 117.5	$ 118.12	$ 117.63
Annual savings in GHG from electricity savings [kg CO2e/year]	9.1	9.1	9.1	9.1	9.1	9.1	8.8	9.1	9.2	9.1
Annual savings in natural gas [m3/year]	56.83	57.51	57.9	58.59	57.7	58.59	52.02	59.28	58.38	58.77
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 526.5	$ 532.86	$ 536.48	$ 542.87	$ 534.58	$ 542.83	$ 481.94	$ 549.22	$ 540.9	$ 544.52
Annual savings in carbon tax for natural gas [$/year]	$ 131.41	$ 133.	$ 133.9	$ 135.5	$ 133.43	$ 135.49	$ 120.29	$ 137.08	$ 135.01	$ 135.91
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 657.92	$ 665.86	$ 670.38	$ 678.36	$ 668.01	$ 678.32	$ 602.23	$ 686.3	$ 675.91	$ 680.44
Annual savings in GHG from natural gas savings [kg CO2e/year]	2920.3	2955.5	2975.6	3011	2965.1	3010.9	2673.1	3046.3	3000.1	3020.2
Net Present Value [$]	$ 2,232.71	$ 1,934.29	$ 1,924.5	$ 1,779.55	$ 1,760.79	$ 1,626.21	$ 1,588.3	$ 1,481.26	$ 1,461.41	$ 1,451.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$.	$ 550.

LARGE 018WWR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 17,527.44	$ 17,738.94	$ 17,906.73	$ 17,956.73	$ 17,978.23	$ 17,988.94	$ 18,206.73	$ 18,228.23	$ 18,288.94	$ 18,368.23
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,527.44	$ 17,738.94	$ 17,906.73	$ 17,956.73	$ 17,978.23	$ 17,988.94	$ 18,206.73	$ 18,228.23	$ 18,288.94	$ 18,368.23
Net Present Value [$]	$ 2,186.86	$ 972.1	$ 2,547.85	$ 1,150.81	$ 1,286.68	$ 2,488.67	$ 2,664.41	$ 2,795.61	$ 1,279.94	$ 2,851.36
Incremental dollars per GHG saving	$ 5.65	$ 5.16	$ 5.77	$ 5.21	$ 5.26	$ 5.73	$ 5.78	$ 5.84	$ 5.24	$ 5.85
Auxiliary Energy Required Heating [GJ/yr]	47.3	49	46.5	48.9	49.3	46.7	46.5	47	49	45.9
Annual Energy DHW [GJ/yr]	21.7	13.5	22.5	13.5	13.5	21.7	21.7	21.7	12.4	22.5
Annual Energy Space Heating [GJ/yr]	50.1	51.9	49.3	51.7	52.2	49.5	49.3	49.8	51.9	48.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	99.2	92.8	99.2	92.7	93.1	98.6	98.4	98.8	91.7	98.5
Design Heating Load [W]	10217.9	9982.4	10122.4	10000.3	9993.6	10104.5	10122.4	10115.6	9982.4	10008.9
Annual Energy Electricity [kWh/yr]	7866.6	7875.5	7862.4	7874.6	7877.1	7863.2	7862.4	7864.7	7875.5	7859
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,049.81	$ 1,051.07	$ 1,049.21	$ 1,050.94	$ 1,051.29	$ 1,049.33	$ 1,049.21	$ 1,049.54	$ 1,051.07	$ 1,048.73
Annual Energy Natural Gas [m3/yr]	1904.2	1731.2	1903.3	1726.8	1739.7	1886.2	1881.4	1893.8	1702.3	1885.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 821.41	$ 746.78	$ 821.02	$ 744.88	$ 750.45	$ 813.64	$ 811.57	$ 816.92	$ 734.31	$ 813.34
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17859	18130	20990	20992	21244	18129	20991	21243	18131	21260
Upgrade Package List	Pkg2221101033	Pkg2221102033	Pkg2231101033	Pkg2231101033	Pkg2231102032	Pkg2221102033	Pkg2231101033	Pkg2231102032	Pkg2221102033	Pkg2231102033
GHGI [kg/m2]	7.3	6.66	7.3	6.64	6.69	7.24	7.22	7.27	6.55	7.23
% ICC	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	25.7	26.6	25.3	26.6	26.8	25.4	25.3	25.5	26.6	24.9
Output: MEUI [kWh/(m2 * yr)]	40	36.5	40	36.4	36.7	39.6	39.5	39.8	35.9	39.6
Output: Better than ERS (%)	2130.0%	2320.0%	2130.0%	2330.0%	2300.0%	2180.0%	2200.0%	2160.0%	2420.0%	2190.0%
Output: Better than Envelope (%)	2350.0%	2070.0%	2480.0%	2090.0%	2020.0%	2440.0%	2480.0%	2390.0%	2070.0%	2570.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	697	688	701	689	687	700	701	699	688	705
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 98.29	$ 97.04	$ 98.88	$ 97.16	$ 96.81	$ 98.77	$ 98.88	$ 98.56	$ 97.04	$ 99.36
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .34	$ .35	$ .34	$ .34	$ .35	$ .35	$ .35	$ .34	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 98.64	$ 97.38	$ 99.23	$ 97.51	$ 97.15	$ 99.12	$ 99.23	$ 98.91	$ 97.38	$ 99.72
Annual savings in GHG from electricity savings [kg CO2e/year]	7.7	7.6	7.7	7.6	7.6	7.7	7.7	7.7	7.6	7.8
Annual savings in natural gas [m3/year]	60.26	66.7	60.29	66.86	66.38	60.93	61.1	60.64	67.78	60.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 558.26	$ 617.98	$ 558.57	$ 619.5	$ 615.05	$ 564.48	$ 566.13	$ 561.85	$ 627.96	$ 564.72
Annual savings in carbon tax for natural gas [$/year]	$ 139.34	$ 154.25	$ 139.42	$ 154.62	$ 153.51	$ 140.89	$ 141.3	$ 140.24	$ 156.74	$ 140.95
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 697.6	$ 772.23	$ 697.99	$ 774.13	$ 768.56	$ 705.37	$ 707.44	$ 702.09	$ 784.7	$ 705.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	3096.4	3427.7	3098.2	3436.1	3411.4	3130.9	3140.1	3116.4	3483	3132.2
Net Present Value [$]	$ 2,186.86	$ 972.1	$ 2,547.85	$ 1,150.81	$ 1,286.68	$ 2,488.67	$ 2,664.41	$ 2,795.61	$ 1,279.94	$ 2,851.36
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$ 600.	$.	$ 600.	$ 600.	$.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$.	$ 550.	$.	$.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.

LARGE 018WWR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 20,888.94	$ 19,168.23	$ 21,106.73	$ 21,128.23	$ 21,438.94	$ 19,387.44	$ 19,718.23	$ 21,738.94	$ 21,656.73	$ 21,678.23
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,888.94	$ 19,168.23	$ 21,106.73	$ 21,128.23	$ 21,438.94	$ 19,387.44	$ 19,718.23	$ 21,738.94	$ 21,656.73	$ 21,678.23
Net Present Value [$]	$ 5,234.45	$ 5,542.01	$ 5,389.25	$ 5,477.76	$ 5,542.78	$ 5,979.09	$ 5,806.17	$ 5,687.55	$ 5,697.4	$ 5,786.09
Incremental dollars per GHG saving	$ 3.48	$ 3.5	$ 3.52	$ 3.52	$ 3.54	$ 3.54	$ 3.56	$ 3.57	$ 3.57	$ 3.58
Auxiliary Energy Required Heating [GJ/yr]	48.9	49.4	48.8	49.2	48.9	48.4	49.4	48.9	48.8	49.2
Annual Energy DHW [GJ/yr]	13.5	23.7	13.5	13.5	12.4	23.8	22.5	11.7	12.4	12.4
Annual Energy Space Heating [GJ/yr]	17.2	17.4	17.1	17.3	17.2	17	17.4	17.2	17.1	17.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.1	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	59.4	69.3	59.3	59.4	58.3	69.6	68	57.7	58.3	58.4
Design Heating Load [W]	10025.5	10578.7	10043.4	10036.6	10025.5	10368.5	10578.7	10025.5	10043.4	10036.6
Annual Energy Electricity [kWh/yr]	12762.1	12653.2	12737.6	12763.6	12762.9	12736.9	12653.2	12763.4	12738.4	12764.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,742.52	$ 1,727.11	$ 1,739.06	$ 1,742.73	$ 1,742.64	$ 1,738.96	$ 1,727.11	$ 1,742.71	$ 1,739.17	$ 1,742.86
Annual Energy Natural Gas [m3/yr]	362.1	637.7	362.1	362.1	333	638	603.6	314.3	333	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 275.08	$ 156.2	$ 156.2	$ 143.64	$ 275.21	$ 260.37	$ 135.58	$ 143.64	$ 143.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18139	21232	21001	21253	18140	17848	21233	18141	21002	21254
Upgrade Package List	Pkg2222102033	Pkg2231102031	Pkg2231101033	Pkg2231102032	Pkg2221102033	Pkg2221101032	Pkg2231102031	Pkg2221102033	Pkg2231101033	Pkg2231102032
GHGI [kg/m2]	1.63	2.66	1.63	1.63	1.52	2.66	2.53	1.45	1.52	1.52
% ICC	1.9%	1.7%	1.9%	1.9%	1.9%	1.7%	1.7%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.6	26.8	26.5	26.8	26.6	26.3	26.8	26.6	26.5	26.8
Output: MEUI [kWh/(m2 * yr)]	18.3	23.7	18.2	18.3	17.7	23.8	23	17.3	17.7	17.7
Output: Better than ERS (%)	5080.0%	4510.0%	5090.0%	5080.0%	5170.0%	4480.0%	4610.0%	5220.0%	5170.0%	5170.0%
Output: Better than Envelope (%)	2090.0%	2010.0%	2100.0%	2040.0%	2090.0%	2170.0%	2010.0%	2090.0%	2100.0%	2040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4198	4090	4174	4200	4199	4173	4090	4200	4175	4201
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 591.97	$ 576.62	$ 588.52	$ 592.19	$ 592.09	$ 588.42	$ 576.62	$ 592.16	$ 588.63	$ 592.31
Annual savings in carbon tax for electricity [$/year]	$ 2.1	$ 2.04	$ 2.09	$ 2.1	$ 2.1	$ 2.09	$ 2.04	$ 2.1	$ 2.09	$ 2.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 594.07	$ 578.66	$ 590.61	$ 594.29	$ 594.19	$ 590.51	$ 578.66	$ 594.26	$ 590.72	$ 594.41
Annual savings in GHG from electricity savings [kg CO2e/year]	46.2	45	45.9	46.2	46.2	45.9	45	46.2	45.9	46.2
Annual savings in natural gas [m3/year]	117.71	107.44	117.71	117.71	118.8	107.43	108.71	119.49	118.8	118.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,090.6	$ 995.46	$ 1,090.6	$ 1,090.6	$ 1,100.65	$ 995.36	$ 1,007.24	$ 1,107.1	$ 1,100.65	$ 1,100.65
Annual savings in carbon tax for natural gas [$/year]	$ 272.21	$ 248.46	$ 272.21	$ 272.21	$ 274.72	$ 248.44	$ 251.4	$ 276.33	$ 274.72	$ 274.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,362.81	$ 1,243.93	$ 1,362.81	$ 1,362.81	$ 1,375.36	$ 1,243.8	$ 1,258.64	$ 1,383.43	$ 1,375.36	$ 1,375.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	6049.1	5521.4	6049.1	6049.1	6104.8	5520.8	5586.7	6140.6	6104.8	6104.8
Net Present Value [$]	$ 5,234.45	$ 5,542.01	$ 5,389.25	$ 5,477.76	$ 5,542.78	$ 5,979.09	$ 5,806.17	$ 5,687.55	$ 5,697.4	$ 5,786.09
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	NA	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	NA	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 550.

LARGE 018WWR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55
Total increase in construction cost [$]	$ 17,738.94	$ 17,956.73	$ 18,288.94	$ 17,978.23	$ 18,588.94	$ 18,418.23	$ 18,506.73	$ 18,528.23	$ 18,806.73	$ 18,828.23
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,738.94	$ 17,956.73	$ 18,288.94	$ 17,978.23	$ 18,588.94	$ 18,418.23	$ 18,506.73	$ 18,528.23	$ 18,806.73	$ 18,828.23
Net Present Value [$]	$ 972.1	$ 1,150.81	$ 1,279.94	$ 1,286.68	$ 1,424.89	$ 1,450.93	$ 1,458.84	$ 1,594.52	$ 1,603.79	$ 1,739.71
Incremental dollars per GHG saving	$ 5.16	$ 5.21	$ 5.24	$ 5.26	$ 5.27	$ 5.3	$ 5.29	$ 5.33	$ 5.32	$ 5.36
Auxiliary Energy Required Heating [GJ/yr]	49	48.9	49	49.3	49	48.2	48.9	49.3	48.9	49.3
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	13.5	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	51.9	51.7	51.9	52.2	51.9	51.1	51.8	52.2	51.8	52.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	92.8	92.7	91.7	93.1	91.1	92	91.6	92.1	90.9	91.4
Design Heating Load [W]	9982.4	10000.3	9982.4	9993.6	9982.4	9886.9	10000.3	9993.6	10000.3	9993.6
Annual Energy Electricity [kWh/yr]	7875.5	7874.6	7875.5	7877.1	7875.5	7871.2	7874.7	7877.1	7874.7	7877.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,051.07	$ 1,050.94	$ 1,051.07	$ 1,051.29	$ 1,051.07	$ 1,050.46	$ 1,050.96	$ 1,051.29	$ 1,050.96	$ 1,051.29
Annual Energy Natural Gas [m3/yr]	1731.2	1726.8	1702.3	1739.7	1683.8	1708.6	1697.9	1710.8	1679.4	1692.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 746.78	$ 744.88	$ 734.31	$ 750.45	$ 726.33	$ 737.03	$ 732.41	$ 737.98	$ 724.43	$ 730.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18130	20992	18131	21244	18132	21262	20993	21245	20994	21246
Upgrade Package List	Pkg2221102033	Pkg2231101033	Pkg2221102033	Pkg2231102032	Pkg2221102033	Pkg2231102033	Pkg2231101033	Pkg2231102032	Pkg2231101033	Pkg2231102032
GHGI [kg/m2]	6.66	6.64	6.55	6.69	6.48	6.57	6.53	6.58	6.46	6.51
% ICC	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.6	26.6	26.6	26.8	26.7	26.2	26.6	26.8	26.6	26.8
Output: MEUI [kWh/(m2 * yr)]	36.5	36.4	35.9	36.7	35.6	36.1	35.9	36.1	35.5	35.7
Output: Better than ERS (%)	2320.0%	2330.0%	2420.0%	2300.0%	2460.0%	2390.0%	2420.0%	2380.0%	2480.0%	2440.0%
Output: Better than Envelope (%)	2070.0%	2090.0%	2070.0%	2020.0%	2070.0%	2200.0%	2090.0%	2020.0%	2090.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	688	689	688	687	688	692	689	687	689	687
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 97.04	$ 97.16	$ 97.04	$ 96.81	$ 97.04	$ 97.64	$ 97.15	$ 96.81	$ 97.15	$ 96.81
Annual savings in carbon tax for electricity [$/year]	$ .34	$ .34	$ .34	$ .34	$ .34	$ .35	$ .34	$ .34	$ .34	$ .34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 97.38	$ 97.51	$ 97.38	$ 97.15	$ 97.38	$ 97.99	$ 97.49	$ 97.15	$ 97.49	$ 97.15
Annual savings in GHG from electricity savings [kg CO2e/year]	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Annual savings in natural gas [m3/year]	66.7	66.86	67.78	66.38	68.47	67.54	67.94	67.46	68.63	68.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 617.98	$ 619.5	$ 627.96	$ 615.05	$ 634.35	$ 625.79	$ 629.48	$ 625.03	$ 635.87	$ 631.41
Annual savings in carbon tax for natural gas [$/year]	$ 154.25	$ 154.62	$ 156.74	$ 153.51	$ 158.33	$ 156.19	$ 157.12	$ 156.	$ 158.71	$ 157.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 772.23	$ 774.13	$ 784.7	$ 768.56	$ 792.68	$ 781.98	$ 786.59	$ 781.03	$ 794.57	$ 789.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	3427.7	3436.1	3483	3411.4	3518.4	3471	3491.4	3466.7	3526.9	3502.2
Net Present Value [$]	$ 972.1	$ 1,150.81	$ 1,279.94	$ 1,286.68	$ 1,424.89	$ 1,450.93	$ 1,458.84	$ 1,594.52	$ 1,603.79	$ 1,739.71
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	10.47	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE 018WWR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 41,177.98	$ 41,199.48	$ 41,417.27	$ 41,639.48	$ 41,677.98	$ 41,727.98	$ 41,749.48	$ 41,857.27	$ 41,878.77	$ 41,967.27
ICC with multiplier (Van=1.0,this Cz =1)	$ 41,177.98	$ 41,199.48	$ 41,417.27	$ 41,639.48	$ 41,677.98	$ 41,727.98	$ 41,749.48	$ 41,857.27	$ 41,878.77	$ 41,967.27
Net Present Value [$]	$ 24,024.93	$ 24,206.55	$ 24,323.63	$ 24,361.54	$ 24,330.47	$ 24,288.36	$ 24,470.96	$ 24,489.2	$ 24,669.24	$ 24,588.03
Incremental dollars per GHG saving	$ 7.5	$ 7.51	$ 7.54	$ 7.58	$ 7.59	$ 7.51	$ 7.52	$ 7.62	$ 7.63	$ 7.55
Auxiliary Energy Required Heating [GJ/yr]	33.1	33.5	33.4	32.5	32.4	33.1	33.5	32.3	32.7	33.4
Annual Energy DHW [GJ/yr]	23.8	23.8	23.8	23.8	23.8	22.5	22.5	23.8	23.8	22.5
Annual Energy Space Heating [GJ/yr]	11.6	11.8	11.7	11.4	11.3	11.6	11.8	11.3	11.5	11.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	64.4	64.6	64.5	64.2	64.1	63.1	63.3	64.1	64.3	63.2
Design Heating Load [W]	8384.5	8377.7	8395.6	8271	8361.6	8384.5	8377.7	8288.9	8282.2	8395.6
Annual Energy Electricity [kWh/yr]	11281	11343.2	11305.1	11232.2	11205.5	11281	11343.2	11198.5	11259.7	11305.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,532.95	$ 1,541.75	$ 1,536.36	$ 1,526.04	$ 1,522.26	$ 1,532.95	$ 1,541.75	$ 1,521.27	$ 1,529.93	$ 1,536.36
Annual Energy Natural Gas [m3/yr]	638.4	638.4	638.1	638.5	638.4	604.2	604.3	638.1	638.2	604
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.38	$ 275.38	$ 275.25	$ 275.43	$ 275.38	$ 260.63	$ 260.67	$ 275.25	$ 275.3	$ 260.54
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	43552	43750	45478	43768	43570	43553	43751	45496	45694	45479
Upgrade Package List	Pkg3321201053	Pkg3321202052	Pkg3331201052	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321202052	Pkg3331201053	Pkg3331202052	Pkg3331201052
GHGI [kg/m2]	2.63	2.64	2.63	2.63	2.63	2.51	2.51	2.63	2.63	2.51
% ICC	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18	18.2	18.1	17.6	17.6	18	18.2	17.6	17.8	18.1
Output: MEUI [kWh/(m2 * yr)]	21	21.1	21	20.9	20.8	20.3	20.4	20.8	20.9	20.3
Output: Better than ERS (%)	4900.0%	4880.0%	4890.0%	4910.0%	4920.0%	5000.0%	4980.0%	4920.0%	4900.0%	4990.0%
Output: Better than Envelope (%)	4640.0%	4580.0%	4600.0%	4740.0%	4760.0%	4640.0%	4580.0%	4770.0%	4710.0%	4600.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2717	2780	2741	2668	2642	2717	2780	2635	2696	2741
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 383.14	$ 391.91	$ 386.54	$ 376.26	$ 372.49	$ 383.14	$ 391.91	$ 371.51	$ 380.14	$ 386.54
Annual savings in carbon tax for electricity [$/year]	$ 1.36	$ 1.39	$ 1.37	$ 1.33	$ 1.32	$ 1.36	$ 1.39	$ 1.32	$ 1.35	$ 1.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 384.5	$ 393.3	$ 387.91	$ 377.59	$ 373.81	$ 384.5	$ 393.3	$ 372.82	$ 381.48	$ 387.91
Annual savings in GHG from electricity savings [kg CO2e/year]	29.9	30.6	30.2	29.4	29.1	29.9	30.6	29	29.7	30.2
Annual savings in natural gas [m3/year]	107.42	107.42	107.43	107.41	107.42	108.69	108.69	107.43	107.42	108.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 995.22	$ 995.22	$ 995.33	$ 995.19	$ 995.22	$ 1,007.03	$ 1,006.99	$ 995.33	$ 995.29	$ 1,007.1
Annual savings in carbon tax for natural gas [$/year]	$ 248.4	$ 248.4	$ 248.43	$ 248.39	$ 248.4	$ 251.35	$ 251.34	$ 248.43	$ 248.42	$ 251.37
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,243.63	$ 1,243.63	$ 1,243.76	$ 1,243.58	$ 1,243.63	$ 1,258.38	$ 1,258.34	$ 1,243.76	$ 1,243.71	$ 1,258.46
Annual savings in GHG from natural gas savings [kg CO2e/year]	5520.1	5520.1	5520.6	5519.9	5520.1	5585.5	5585.4	5520.6	5520.4	5585.9
Net Present Value [$]	$ 24,024.93	$ 24,206.55	$ 24,323.63	$ 24,361.54	$ 24,330.47	$ 24,288.36	$ 24,470.96	$ 24,489.2	$ 24,669.24	$ 24,588.03
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 550.

LARGE 018WWR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 48,068.02	$ 43,418.77	$ 48,368.02	$ 43,968.77	$ 44,268.77	$ 48,707.02	$ 44,070.73	$ 49,007.02	$ 49,119.38	$ 44,620.73
ICC with multiplier (Van=1.0,this Cz =1)	$ 48,068.02	$ 43,418.77	$ 48,368.02	$ 43,968.77	$ 44,268.77	$ 48,707.02	$ 44,070.73	$ 49,007.02	$ 49,119.38	$ 44,620.73
Net Present Value [$]	$ 30,898.65	$ 23,992.81	$ 30,909.8	$ 24,300.95	$ 24,445.73	$ 31,537.65	$ 24,679.82	$ 31,548.8	$ 32,324.68	$ 24,987.97
Incremental dollars per GHG saving	$ 7.19	$ 7.21	$ 7.23	$ 7.24	$ 7.25	$ 7.28	$ 7.32	$ 7.32	$ 7.34	$ 7.35
Auxiliary Energy Required Heating [GJ/yr]	33.5	33.2	33.4	33.2	33.2	33.5	33.1	33.4	33.3	33.1
Annual Energy DHW [GJ/yr]	7.3	13.5	6.9	12.4	11.7	7.3	13.5	6.9	7.8	12.4
Annual Energy Space Heating [GJ/yr]	11.8	11.7	11.7	11.7	11.7	11.8	11.7	11.7	11.8	11.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	48.1	54.2	47.7	53.1	52.4	48.1	54.2	47.7	48.6	53.1
Design Heating Load [W]	7765.4	8031.5	7765.4	8031.5	8031.5	7765.4	8060.4	7765.4	7699.2	8060.4
Annual Energy Electricity [kWh/yr]	13351.8	11297.1	13239.6	11297.9	11298.4	13351.8	11310.7	13239.6	13497.3	11311.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,825.96	$ 1,535.22	$ 1,810.09	$ 1,535.34	$ 1,535.41	$ 1,825.96	$ 1,537.15	$ 1,810.09	$ 1,846.55	$ 1,537.26
Annual Energy Natural Gas [m3/yr]	0	362.1	0	333	314.3	0	362.1	0	0	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 156.2	$.	$ 143.64	$ 135.58	$.	$ 156.2	$.	$.	$ 143.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51803	45733	51804	45734	45735	52091	44005	52092	52378	44006
Upgrade Package List	Pkg4331303054	Pkg3331202054	Pkg4331303054	Pkg3331202054	Pkg3331202054	Pkg4331403054	Pkg3321203054	Pkg4331403054	Pkg4341303054	Pkg3321203054
GHGI [kg/m2]	0.29	1.6	0.29	1.49	1.42	0.29	1.6	0.29	0.29	1.49
% ICC	4.3%	3.9%	4.3%	3.9%	3.9%	4.3%	3.9%	4.3%	4.4%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18.2	18	18.2	18	18.1	18.2	18	18.2	18.1	18
Output: MEUI [kWh/(m2 * yr)]	12.1	15.4	11.9	14.8	14.4	12.1	15.4	11.9	12.4	14.9
Output: Better than ERS (%)	6010.0%	5510.0%	6040.0%	5600.0%	5660.0%	6010.0%	5510.0%	6040.0%	5970.0%	5600.0%
Output: Better than Envelope (%)	4580.0%	4630.0%	4600.0%	4630.0%	4630.0%	4580.0%	4640.0%	4600.0%	4610.0%	4640.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4788	2733	4676	2734	2735	4788	2747	4676	4934	2748
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 675.12	$ 385.41	$ 659.3	$ 385.52	$ 385.59	$ 675.12	$ 387.33	$ 659.3	$ 695.64	$ 387.44
Annual savings in carbon tax for electricity [$/year]	$ 2.39	$ 1.37	$ 2.34	$ 1.37	$ 1.37	$ 2.39	$ 1.37	$ 2.34	$ 2.47	$ 1.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 677.52	$ 386.78	$ 661.64	$ 386.89	$ 386.96	$ 677.52	$ 388.7	$ 661.64	$ 698.1	$ 388.81
Annual savings in GHG from electricity savings [kg CO2e/year]	52.7	30.1	51.4	30.1	30.1	52.7	30.2	51.4	54.3	30.2
Annual savings in natural gas [m3/year]	131.2	117.71	131.2	118.8	119.49	131.2	117.71	131.2	131.2	118.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,215.6	$ 1,090.6	$ 1,215.6	$ 1,100.65	$ 1,107.1	$ 1,215.6	$ 1,090.6	$ 1,215.6	$ 1,215.6	$ 1,100.65
Annual savings in carbon tax for natural gas [$/year]	$ 303.41	$ 272.21	$ 303.41	$ 274.72	$ 276.33	$ 303.41	$ 272.21	$ 303.41	$ 303.41	$ 274.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,519.01	$ 1,362.81	$ 1,519.01	$ 1,375.36	$ 1,383.43	$ 1,519.01	$ 1,362.81	$ 1,519.01	$ 1,519.01	$ 1,375.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	6742.4	6049.1	6742.4	6104.8	6140.6	6742.4	6049.1	6742.4	6742.4	6104.8
Net Present Value [$]	$ 30,898.65	$ 23,992.81	$ 30,909.8	$ 24,300.95	$ 24,445.73	$ 31,537.65	$ 24,679.82	$ 31,548.8	$ 32,324.68	$ 24,987.97
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	10.47	14.09	10.47	10.47	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 2,775.11	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR20	BC EffR10	BC EffR20	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75	$ 4,774.75	$ 3,141.75	$ 4,774.75	$ 4,135.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$.	$ 550.

LARGE 018WWR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 43,418.77	$ 41,177.98	$ 41,199.48	$ 46,045.38	$ 41,727.98	$ 43,968.77	$ 41,417.27	$ 41,677.98	$ 41,639.48	$ 42,027.98
ICC with multiplier (Van=1.0,this Cz =1)	$ 43,418.77	$ 41,177.98	$ 41,199.48	$ 46,045.38	$ 41,727.98	$ 43,968.77	$ 41,417.27	$ 41,677.98	$ 41,639.48	$ 42,027.98
Net Present Value [$]	$ 23,992.81	$ 24,024.93	$ 24,206.55	$ 24,255.11	$ 24,288.36	$ 24,300.95	$ 24,323.63	$ 24,330.47	$ 24,361.54	$ 24,404.92
Incremental dollars per GHG saving	$ 7.21	$ 7.5	$ 7.51	$ 10.17	$ 7.51	$ 7.24	$ 7.54	$ 7.59	$ 7.58	$ 7.51
Auxiliary Energy Required Heating [GJ/yr]	33.2	33.1	33.5	30.3	33.1	33.2	33.4	32.4	32.5	33.1
Annual Energy DHW [GJ/yr]	13.5	23.8	23.8	11.7	22.5	12.4	23.8	23.8	23.8	21.7
Annual Energy Space Heating [GJ/yr]	11.7	11.6	11.8	32.1	11.6	11.7	11.7	11.3	11.4	11.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	54.2	64.4	64.6	71.3	63.1	53.1	64.5	64.1	64.2	62.3
Design Heating Load [W]	8031.5	8384.5	8377.7	7553.1	8384.5	8031.5	8395.6	8361.6	8271	8384.5
Annual Energy Electricity [kWh/yr]	11297.1	11281	11343.2	7776.8	11281	11297.9	11305.1	11205.5	11232.2	11281
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,535.22	$ 1,532.95	$ 1,541.75	$ 1,037.1	$ 1,532.95	$ 1,535.34	$ 1,536.36	$ 1,522.26	$ 1,526.04	$ 1,532.95
Annual Energy Natural Gas [m3/yr]	362.1	638.4	638.4	1161.8	604.2	333	638.1	638.4	638.5	582.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 275.38	$ 275.38	$ 501.16	$ 260.63	$ 143.64	$ 275.25	$ 275.38	$ 275.43	$ 251.18
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45733	43552	43750	52368	43553	45734	45478	43570	43768	43554
Upgrade Package List	Pkg3331202054	Pkg3321201053	Pkg3321202052	Pkg4341303054	Pkg3321201053	Pkg3331202054	Pkg3331201052	Pkg3321201054	Pkg3321202053	Pkg3321201053
GHGI [kg/m2]	1.6	2.63	2.64	4.52	2.51	1.49	2.63	2.63	2.63	2.42
% ICC	3.9%	3.7%	3.7%	4.1%	3.7%	3.9%	3.7%	3.7%	3.7%	3.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	18	18	18.2	16.5	18	18	18.1	17.6	17.6	18
Output: MEUI [kWh/(m2 * yr)]	15.4	21	21.1	24.8	20.3	14.8	21	20.8	20.9	19.8
Output: Better than ERS (%)	5510.0%	4900.0%	4880.0%	4100.0%	5000.0%	5600.0%	4890.0%	4920.0%	4910.0%	5060.0%
Output: Better than Envelope (%)	4630.0%	4640.0%	4580.0%	5100.0%	4640.0%	4630.0%	4600.0%	4760.0%	4740.0%	4640.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2733	2717	2780	787	2717	2734	2741	2642	2668	2717
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 385.41	$ 383.14	$ 391.91	$ 110.95	$ 383.14	$ 385.52	$ 386.54	$ 372.49	$ 376.26	$ 383.14
Annual savings in carbon tax for electricity [$/year]	$ 1.37	$ 1.36	$ 1.39	$ .39	$ 1.36	$ 1.37	$ 1.37	$ 1.32	$ 1.33	$ 1.36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 386.78	$ 384.5	$ 393.3	$ 111.35	$ 384.5	$ 386.89	$ 387.91	$ 373.81	$ 377.59	$ 384.5
Annual savings in GHG from electricity savings [kg CO2e/year]	30.1	29.9	30.6	8.7	29.9	30.1	30.2	29.1	29.4	29.9
Annual savings in natural gas [m3/year]	117.71	107.42	107.42	87.92	108.69	118.8	107.43	107.42	107.41	109.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,090.6	$ 995.22	$ 995.22	$ 814.54	$ 1,007.03	$ 1,100.65	$ 995.33	$ 995.22	$ 995.19	$ 1,014.59
Annual savings in carbon tax for natural gas [$/year]	$ 272.21	$ 248.4	$ 248.4	$ 203.31	$ 251.35	$ 274.72	$ 248.43	$ 248.4	$ 248.39	$ 253.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,362.81	$ 1,243.63	$ 1,243.63	$ 1,017.85	$ 1,258.38	$ 1,375.36	$ 1,243.76	$ 1,243.63	$ 1,243.58	$ 1,267.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	6049.1	5520.1	5520.1	4517.9	5585.5	6104.8	5520.6	5520.1	5519.9	5627.5
Net Present Value [$]	$ 23,992.81	$ 24,024.93	$ 24,206.55	$ 24,255.11	$ 24,288.36	$ 24,300.95	$ 24,323.63	$ 24,330.47	$ 24,361.54	$ 24,404.92
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	14.09	8.77	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR80	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 2,431.75	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 494.46	$ 494.46	$ 2,775.11	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	NBC gas furnace	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$ 550.	$ 550.	$.	$.	$.	$ 850.

LARGE 018WWR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 11,571.73	$ 12,033.23	$ 12,071.73	$ 12,121.73	$ 12,251.02	$ 12,421.73	$ 12,424.79	$ 12,533.23	$ 12,583.23	$ 12,621.73
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 12,416.47	$ 12,911.66	$ 12,952.97	$ 13,006.62	$ 13,145.34	$ 13,328.52	$ 13,331.8	$ 13,448.16	$ 13,501.81	$ 13,543.12
Net Present Value [$]	$ 2,240.35	$ 1,971.25	$ 3,339.19	$ 1,976.92	$ 1,797.56	$ 1,860.36	$ 1,413.44	$ 3,069.3	$ 1,707.57	$ 3,074.79
Incremental dollars per GHG saving	$ 4.34	$ 4.45	$ 4.01	$ 4.44	$ 4.51	$ 4.48	$ 4.65	$ 4.11	$ 4.54	$ 4.1
Auxiliary Energy Required Heating [GJ/yr]	78.9	78.2	72.5	78.9	78	78.9	78.8	71.7	78.2	72.5
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	23.7	21.6	23.7	23.7	22.5	22.5
Annual Energy Space Heating [GJ/yr]	83.6	82.8	76.8	83.6	82.6	83.6	83.5	75.9	82.8	76.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	134.1	133.3	127.2	132.8	133.1	132	134	126.4	132	126
Design Heating Load [W]	15855.6	15710.9	14592.3	15855.6	15741.7	15855.6	14592.3	14447.5	15710.9	14592.3
Annual Energy Electricity [kWh/yr]	7844.9	7840.8	7810.8	7844.9	7839.9	7844.9	7844.5	7806.7	7840.8	7810.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,046.74	$ 1,046.16	$ 1,041.91	$ 1,046.74	$ 1,046.03	$ 1,046.74	$ 1,046.68	$ 1,041.33	$ 1,046.16	$ 1,041.91
Annual Energy Natural Gas [m3/yr]	2842.2	2820.5	2661.8	2808	2815.5	2786.1	2839.2	2640.2	2786.3	2627.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,226.03	$ 1,216.67	$ 1,148.21	$ 1,211.27	$ 1,214.51	$ 1,201.83	$ 1,224.73	$ 1,138.89	$ 1,201.91	$ 1,133.5
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1729	1999	11449	1730	3349	1731	11395	11719	2000	11450
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1131101031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg1121102031	Pkg2121101031
GHGI [kg/m2]	10.82	10.74	10.14	10.69	10.72	10.61	10.81	10.06	10.61	10.01
% ICC	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.9	42.5	39.4	42.9	42.4	42.9	42.9	39	42.5	39.4
Output: MEUI [kWh/(m2 * yr)]	59	58.5	55.2	58.3	58.4	57.8	58.9	54.8	57.8	54.6
Output: Better than ERS (%)	890.0%	940.0%	1360.0%	980.0%	960.0%	1030.0%	900.0%	1410.0%	1030.0%	1440.0%
Output: Better than Envelope (%)	370.0%	280.0%	470.0%	370.0%	250.0%	370.0%	350.0%	580.0%	280.0%	470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	853	857	887	853	858	853	854	892	857	887
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 120.32	$ 120.89	$ 125.12	$ 120.32	$ 121.02	$ 120.32	$ 120.37	$ 125.7	$ 120.89	$ 125.12
Annual savings in carbon tax for electricity [$/year]	$ .43	$ .43	$ .44	$ .43	$ .43	$ .43	$ .43	$ .45	$ .43	$ .44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 120.74	$ 121.32	$ 125.57	$ 120.74	$ 121.45	$ 120.74	$ 120.8	$ 126.15	$ 121.32	$ 125.57
Annual savings in GHG from electricity savings [kg CO2e/year]	9.4	9.4	9.8	9.4	9.4	9.4	9.4	9.8	9.4	9.8
Annual savings in natural gas [m3/year]	51.67	52.48	58.39	52.94	52.66	53.76	51.78	59.19	53.75	59.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 478.69	$ 486.19	$ 540.97	$ 490.5	$ 487.91	$ 498.06	$ 479.73	$ 548.43	$ 497.99	$ 552.74
Annual savings in carbon tax for natural gas [$/year]	$ 119.48	$ 121.35	$ 135.02	$ 122.43	$ 121.78	$ 124.31	$ 119.74	$ 136.88	$ 124.3	$ 137.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 598.17	$ 607.53	$ 675.99	$ 612.93	$ 609.69	$ 622.37	$ 599.47	$ 685.31	$ 622.29	$ 690.7
Annual savings in GHG from natural gas savings [kg CO2e/year]	2655.1	2696.7	3000.5	2720.6	2706.2	2762.5	2660.9	3041.9	2762.1	3065.8
Net Present Value [$]	$ 2,240.35	$ 1,971.25	$ 3,339.19	$ 1,976.92	$ 1,797.56	$ 1,860.36	$ 1,413.44	$ 3,069.3	$ 1,707.57	$ 3,074.79
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 4,001.26	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 550.

LARGE 018WWR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,595.73	$ 17,057.23	$ 17,145.73	$ 15,783.23	$ 15,821.73	$ 17,275.02	$ 14,721.73	$ 17,445.73	$ 16,001.02	$ 17,607.23
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,807.22	$ 18,302.41	$ 18,397.37	$ 16,935.41	$ 16,976.72	$ 18,536.1	$ 15,796.42	$ 18,719.27	$ 17,169.09	$ 18,892.56
Net Present Value [$]	$ 10,797.41	$ 11,019.54	$ 10,885.83	$ 7,971.52	$ 6,467.54	$ 11,183.83	$ 8,693.01	$ 10,638.81	$ 8,130.15	$ 11,108.15
Incremental dollars per GHG saving	$ 2.08	$ 2.14	$ 2.15	$ 2.16	$ 2.17	$ 2.17	$ 2.17	$ 2.19	$ 2.19	$ 2.21
Auxiliary Energy Required Heating [GJ/yr]	78	77.3	77.8	80.1	74.4	77.1	78.8	77.6	79.9	77
Annual Energy DHW [GJ/yr]	7.8	7.8	7.3	13.5	13.5	7.8	23.7	6.9	13.5	7.3
Annual Energy Space Heating [GJ/yr]	32.6	32.2	32.5	33.3	31.2	32.2	32.6	32.1	33.2	32.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	72.7	72.4	72.1	79.2	77	72.3	88.7	71.3	79.1	71.8
Design Heating Load [W]	14650	14505.3	14650	15578.6	14457.1	14536.1	15916.4	14650	15609.5	14505.3
Annual Energy Electricity [kWh/yr]	20205.1	20112.1	20025.8	18244.9	17645.7	20091.3	18040.8	19813.3	18221.9	19932.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,795.71	$ 2,782.55	$ 2,770.34	$ 2,518.34	$ 2,433.55	$ 2,779.6	$ 2,489.46	$ 2,740.27	$ 2,515.08	$ 2,757.19
Annual Energy Natural Gas [m3/yr]	0	0	0	362.1	362.1	0	637.7	0	362.1	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 156.2	$ 156.2	$.	$ 275.08	$.	$ 156.2	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	11734	11465	2011	11461	13084	1738	11466	3361	11735
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg1121102031	Pkg2121101031	Pkg2131101031	Pkg1121101031	Pkg2121101031	Pkg1131101031	Pkg2121102031
GHGI [kg/m2]	0.43	0.43	0.43	1.75	1.74	0.43	2.78	0.43	1.75	0.43
% ICC	1.5%	1.5%	1.5%	1.4%	1.4%	1.5%	1.3%	1.5%	1.4%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	42.4	42	42.3	43.5	40.4	41.9	42.8	42.2	43.4	41.9
Output: MEUI [kWh/(m2 * yr)]	25.1	24.9	24.8	28.6	27.4	24.9	33.8	24.3	28.6	24.6
Output: Better than ERS (%)	4990.0%	5010.0%	5030.0%	4540.0%	4690.0%	5020.0%	4120.0%	5090.0%	4550.0%	5060.0%
Output: Better than Envelope (%)	250.0%	160.0%	220.0%	530.0%	220.0%	130.0%	350.0%	200.0%	500.0%	120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11507	11414	11328	9547	8948	11393	9343	11115	9524	11235
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,622.47	$ 1,609.36	$ 1,597.19	$ 1,346.08	$ 1,261.6	$ 1,606.43	$ 1,317.31	$ 1,567.23	$ 1,342.84	$ 1,584.09
Annual savings in carbon tax for electricity [$/year]	$ 5.75	$ 5.71	$ 5.66	$ 4.77	$ 4.47	$ 5.7	$ 4.67	$ 5.56	$ 4.76	$ 5.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,628.23	$ 1,615.07	$ 1,602.86	$ 1,350.86	$ 1,266.07	$ 1,612.12	$ 1,321.98	$ 1,572.79	$ 1,347.6	$ 1,589.71
Annual savings in GHG from electricity savings [kg CO2e/year]	126.6	125.6	124.6	105	98.4	125.3	102.8	122.3	104.8	123.6
Annual savings in natural gas [m3/year]	157.56	157.56	157.56	144.07	144.07	157.56	133.8	157.56	144.07	157.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,459.83	$ 1,459.83	$ 1,459.83	$ 1,334.83	$ 1,334.83	$ 1,459.83	$ 1,239.7	$ 1,459.83	$ 1,334.83	$ 1,459.83
Annual savings in carbon tax for natural gas [$/year]	$ 364.37	$ 364.37	$ 364.37	$ 333.17	$ 333.17	$ 364.37	$ 309.42	$ 364.37	$ 333.17	$ 364.37
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,824.2	$ 1,824.2	$ 1,824.2	$ 1,668.	$ 1,668.	$ 1,824.2	$ 1,549.12	$ 1,824.2	$ 1,668.	$ 1,824.2
Annual savings in GHG from natural gas savings [kg CO2e/year]	8097.1	8097.1	8097.1	7403.7	7403.7	8097.1	6876.1	8097.1	7403.7	8097.1
Net Present Value [$]	$ 10,797.41	$ 11,019.54	$ 10,885.83	$ 7,971.52	$ 6,467.54	$ 11,183.83	$ 8,693.01	$ 10,638.81	$ 8,130.15	$ 11,108.15
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$.	$ 1,374.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$.	$.	$ 850.	$.	$ 550.

LARGE 018WWR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 13,351.02	$ 13,521.73	$ 13,683.23	$ 13,812.52	$ 13,983.23	$ 13,901.02	$ 14,201.02
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 13,596.77	$ 14,091.96	$ 14,186.92	$ 14,325.64	$ 14,508.82	$ 14,682.11	$ 14,820.83	$ 15,004.01	$ 14,915.79	$ 15,237.69
Net Present Value [$]	$ 4,529.28	$ 4,261.81	$ 4,221.26	$ 4,085.95	$ 4,077.04	$ 3,953.	$ 3,816.78	$ 3,808.84	$ 3,777.14	$ 3,632.55
Incremental dollars per GHG saving	$ 3.7	$ 3.79	$ 3.8	$ 3.84	$ 3.85	$ 3.88	$ 3.93	$ 3.93	$ 3.94	$ 3.98
Auxiliary Energy Required Heating [GJ/yr]	74.6	73.8	74.6	73.6	74.6	73.8	72.8	73.8	73.6	73.6
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	12.4	13.5	11.7	12.4	11.7
Annual Energy Space Heating [GJ/yr]	79	78.1	79	78	79	78.2	77.1	78.2	78	78
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	119.2	118.4	118.1	118.2	117.4	117.3	117.4	116.6	117.1	116.4
Design Heating Load [W]	14400.2	14255.4	14400.2	14286.3	14400.2	14255.4	14141.5	14255.4	14286.3	14286.3
Annual Energy Electricity [kWh/yr]	7821.8	7817.7	7821.9	7816.8	7821.9	7817.7	7812.7	7817.8	7816.8	7816.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,043.47	$ 1,042.89	$ 1,043.48	$ 1,042.76	$ 1,043.48	$ 1,042.89	$ 1,042.18	$ 1,042.9	$ 1,042.76	$ 1,042.78
Annual Energy Natural Gas [m3/yr]	2444.7	2422.8	2415.8	2418.1	2397.2	2394	2396.4	2375.4	2389.3	2370.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,054.56	$ 1,045.11	$ 1,042.09	$ 1,043.08	$ 1,034.07	$ 1,032.69	$ 1,033.72	$ 1,024.66	$ 1,030.66	$ 1,022.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	13072	11454	11723	13342	11724	13073	13074
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2131101031
GHGI [kg/m2]	9.33	9.25	9.22	9.23	9.15	9.14	9.15	9.07	9.12	9.05
% ICC	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	40.5	40.1	40.5	40	40.5	40.1	39.6	40.1	40	40
Output: MEUI [kWh/(m2 * yr)]	50.9	50.4	50.3	50.3	49.9	49.8	49.9	49.5	49.7	49.4
Output: Better than ERS (%)	1580.0%	1640.0%	1660.0%	1650.0%	1710.0%	1720.0%	1710.0%	1770.0%	1730.0%	1780.0%
Output: Better than Envelope (%)	200.0%	300.0%	200.0%	330.0%	200.0%	300.0%	430.0%	300.0%	330.0%	330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	876	880	876	881	876	880	886	880	881	881
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 123.57	$ 124.15	$ 123.56	$ 124.28	$ 123.56	$ 124.15	$ 124.86	$ 124.14	$ 124.28	$ 124.26
Annual savings in carbon tax for electricity [$/year]	$ .44	$ .44	$ .44	$ .44	$ .44	$ .44	$ .44	$ .44	$ .44	$ .44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 124.01	$ 124.59	$ 124.	$ 124.72	$ 124.	$ 124.59	$ 125.3	$ 124.58	$ 124.72	$ 124.7
Annual savings in GHG from electricity savings [kg CO2e/year]	9.6	9.7	9.6	9.7	9.6	9.7	9.7	9.7	9.7	9.7
Annual savings in natural gas [m3/year]	66.48	67.29	67.55	67.47	68.25	68.37	68.28	69.06	68.54	69.23
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 615.91	$ 623.47	$ 625.89	$ 625.1	$ 632.31	$ 633.41	$ 632.59	$ 639.84	$ 635.04	$ 641.46
Annual savings in carbon tax for natural gas [$/year]	$ 153.73	$ 155.62	$ 156.22	$ 156.02	$ 157.82	$ 158.1	$ 157.89	$ 159.7	$ 158.5	$ 160.1
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 769.64	$ 779.09	$ 782.11	$ 781.12	$ 790.13	$ 791.51	$ 790.48	$ 799.54	$ 793.54	$ 801.56
Annual savings in GHG from natural gas savings [kg CO2e/year]	3416.2	3458.1	3471.5	3467.1	3507.1	3513.3	3508.7	3548.9	3522.3	3557.9
Net Present Value [$]	$ 4,529.28	$ 4,261.81	$ 4,221.26	$ 4,085.95	$ 4,077.04	$ 3,953.	$ 3,816.78	$ 3,808.84	$ 3,777.14	$ 3,632.55
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.

LARGE 018WWR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 17,138.94	$ 17,356.73	$ 17,688.94	$ 17,818.23	$ 17,906.73	$ 17,988.94	$ 18,206.73	$ 18,368.23	$ 18,668.23	$ 19,879.19
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,390.08	$ 18,623.77	$ 18,980.23	$ 19,118.96	$ 19,213.92	$ 19,302.13	$ 19,535.82	$ 19,709.11	$ 20,031.01	$ 21,330.37
Net Present Value [$]	$ 499.52	$ 323.23	$ 235.84	$ 51.64	$ 58.82	$ 120.25	$ 57.01	$ 212.77	$ 328.6	$ 1,976.87
Incremental dollars per GHG saving	$ 4.77	$ 4.82	$ 4.83	$ 4.89	$ 4.88	$ 4.86	$ 4.91	$ 4.95	$ 4.98	$ 5.44
Auxiliary Energy Required Heating [GJ/yr]	61.5	61.3	61.5	60.6	61.3	61.5	61.3	60.6	60.6	60.4
Annual Energy DHW [GJ/yr]	23.7	23.7	22.5	23.7	22.5	21.7	21.6	22.5	21.7	23.7
Annual Energy Space Heating [GJ/yr]	65.1	65	65.1	64.2	65	65.1	65	64.2	64.2	64
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	116.3	116.1	115	115.3	114.9	114.2	114	114.1	113.2	115.2
Design Heating Load [W]	13002.5	13033.4	13002.5	12888.6	13033.4	13002.5	13033.4	12888.6	12888.6	12655.8
Annual Energy Electricity [kWh/yr]	7941.5	7940.7	7941.5	7936.6	7940.7	7941.5	7940.7	7936.6	7936.6	7935.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,060.41	$ 1,060.29	$ 1,060.41	$ 1,059.71	$ 1,060.29	$ 1,060.41	$ 1,060.29	$ 1,059.71	$ 1,059.71	$ 1,059.61
Annual Energy Natural Gas [m3/yr]	2355.7	2351	2321.5	2329.6	2316.9	2299.5	2294.9	2295.5	2273.5	2325.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,016.17	$ 1,014.14	$ 1,001.41	$ 1,004.91	$ 999.43	$ 991.92	$ 989.94	$ 990.2	$ 980.71	$ 1,003.31
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18127	20989	18128	21259	20990	18129	20991	21260	21261	35641
Upgrade Package List	Pkg2221102033	Pkg2231101033	Pkg2221102033	Pkg2231102033	Pkg2231101033	Pkg2221102033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3221201032
GHGI [kg/m2]	9	8.98	8.87	8.9	8.85	8.79	8.77	8.77	8.69	8.89
% ICC	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.4	33.3	33.4	32.9	33.3	33.4	33.3	32.9	32.9	32.9
Output: MEUI [kWh/(m2 * yr)]	49.3	49.2	48.6	48.8	48.5	48.2	48.1	48.1	47.6	48.7
Output: Better than ERS (%)	2100.0%	2110.0%	2190.0%	2170.0%	2190.0%	2240.0%	2260.0%	2250.0%	2310.0%	2170.0%
Output: Better than Envelope (%)	1920.0%	1940.0%	1920.0%	2040.0%	1940.0%	1920.0%	1940.0%	2040.0%	2040.0%	2060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	757	758	757	762	758	757	758	762	762	762
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 106.69	$ 106.81	$ 106.69	$ 107.39	$ 106.81	$ 106.69	$ 106.81	$ 107.39	$ 107.39	$ 107.48
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 107.07	$ 107.19	$ 107.07	$ 107.77	$ 107.19	$ 107.07	$ 107.19	$ 107.77	$ 107.77	$ 107.87
Annual savings in GHG from electricity savings [kg CO2e/year]	8.3	8.3	8.3	8.4	8.3	8.3	8.3	8.4	8.4	8.4
Annual savings in natural gas [m3/year]	69.79	69.97	71.07	70.77	71.24	71.89	72.06	72.04	72.86	70.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 646.64	$ 648.26	$ 658.44	$ 655.65	$ 660.03	$ 666.04	$ 667.62	$ 667.42	$ 675.01	$ 656.92
Annual savings in carbon tax for natural gas [$/year]	$ 161.4	$ 161.8	$ 164.34	$ 163.65	$ 164.74	$ 166.24	$ 166.64	$ 166.58	$ 168.48	$ 163.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 808.03	$ 810.06	$ 822.79	$ 819.29	$ 824.77	$ 832.28	$ 834.26	$ 834.	$ 843.49	$ 820.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	3586.6	3595.6	3652.1	3636.6	3660.9	3694.2	3703	3701.9	3744	3643.7
Net Present Value [$]	$ 499.52	$ 323.23	$ 235.84	$ 51.64	$ 58.82	$ 120.25	$ 57.01	$ 212.77	$ 328.6	$ 1,976.87
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$.

LARGE 018WWR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 20,288.94	$ 20,506.73	$ 20,838.94	$ 21,138.94	$ 21,056.73	$ 20,968.23	$ 21,356.73	$ 21,518.23	$ 21,818.23	$ 24,069.19
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 21,770.03	$ 22,003.72	$ 22,360.18	$ 22,682.08	$ 22,593.87	$ 22,498.91	$ 22,915.77	$ 23,089.06	$ 23,410.96	$ 25,826.24
Net Present Value [$]	$ 9,924.12	$ 9,984.23	$ 10,187.56	$ 10,304.12	$ 10,248.64	$ 10,269.17	$ 10,364.23	$ 10,532.85	$ 10,649.41	$ 11,021.85
Incremental dollars per GHG saving	$ 2.99	$ 3.02	$ 3.04	$ 3.06	$ 3.07	$ 3.09	$ 3.1	$ 3.14	$ 3.16	$ 3.29
Auxiliary Energy Required Heating [GJ/yr]	61.4	61.2	61.4	61.4	61.2	60.5	61.2	60.5	60.5	61
Annual Energy DHW [GJ/yr]	23.8	23.7	22.5	21.7	22.5	23.7	21.7	22.5	21.7	13.5
Annual Energy Space Heating [GJ/yr]	25.5	25.3	25.5	25.5	25.3	25.1	25.3	25.1	25.1	25
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	82.6	82.4	81.4	80.5	81.1	82.2	80.3	80.9	80.1	71.8
Design Heating Load [W]	13060.2	13091.1	13060.2	13060.2	13091.1	12946.3	13091.1	12946.3	12946.3	12383
Annual Energy Electricity [kWh/yr]	16355.5	16295.6	16355.5	16355.5	16295.6	16226.7	16295.6	16226.7	16226.7	16211.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,250.99	$ 2,242.51	$ 2,250.99	$ 2,250.99	$ 2,242.51	$ 2,232.76	$ 2,242.51	$ 2,232.76	$ 2,232.76	$ 2,230.57
Annual Energy Natural Gas [m3/yr]	638	637.6	603.8	581.9	603.5	637.7	581.5	603.5	581.6	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.21	$ 275.04	$ 260.46	$ 251.01	$ 260.33	$ 275.08	$ 250.84	$ 260.33	$ 250.88	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18136	20998	18137	18138	20999	21268	21000	21269	21270	35671
Upgrade Package List	Pkg2221102033	Pkg2231101033	Pkg2221102033	Pkg2221102033	Pkg2231101033	Pkg2231102033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3221201033
GHGI [kg/m2]	2.74	2.74	2.61	2.53	2.61	2.74	2.53	2.61	2.53	1.71
% ICC	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.4	33.3	33.4	33.4	33.3	32.9	33.3	32.9	32.9	33.2
Output: MEUI [kWh/(m2 * yr)]	30.5	30.3	29.8	29.3	29.6	30.2	29.2	29.5	29.1	24.6
Output: Better than ERS (%)	4530.0%	4540.0%	4610.0%	4670.0%	4630.0%	4550.0%	4680.0%	4640.0%	4690.0%	5050.0%
Output: Better than Envelope (%)	1930.0%	1960.0%	1930.0%	1930.0%	1960.0%	2050.0%	1960.0%	2050.0%	2050.0%	1980.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7657	7597	7657	7657	7597	7528	7597	7528	7528	7513
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,079.68	$ 1,071.23	$ 1,079.68	$ 1,079.68	$ 1,071.23	$ 1,061.52	$ 1,071.23	$ 1,061.52	$ 1,061.52	$ 1,059.33
Annual savings in carbon tax for electricity [$/year]	$ 3.83	$ 3.8	$ 3.83	$ 3.83	$ 3.8	$ 3.76	$ 3.8	$ 3.76	$ 3.76	$ 3.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,083.51	$ 1,075.03	$ 1,083.51	$ 1,083.51	$ 1,075.03	$ 1,065.28	$ 1,075.03	$ 1,065.28	$ 1,065.28	$ 1,063.09
Annual savings in GHG from electricity savings [kg CO2e/year]	84.2	83.6	84.2	84.2	83.6	82.8	83.6	82.8	82.8	82.6
Annual savings in natural gas [m3/year]	133.79	133.81	135.07	135.88	135.08	133.8	135.9	135.08	135.89	144.07
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,239.59	$ 1,239.73	$ 1,251.4	$ 1,258.96	$ 1,251.5	$ 1,239.7	$ 1,259.1	$ 1,251.5	$ 1,259.06	$ 1,334.83
Annual savings in carbon tax for natural gas [$/year]	$ 309.4	$ 309.43	$ 312.34	$ 314.23	$ 312.37	$ 309.42	$ 314.26	$ 312.37	$ 314.26	$ 333.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,548.99	$ 1,549.16	$ 1,563.74	$ 1,573.19	$ 1,563.87	$ 1,549.12	$ 1,573.36	$ 1,563.87	$ 1,573.32	$ 1,668.
Annual savings in GHG from natural gas savings [kg CO2e/year]	6875.5	6876.2	6941	6982.9	6941.5	6876.1	6983.7	6941.5	6983.5	7403.7
Net Present Value [$]	$ 9,924.12	$ 9,984.23	$ 10,187.56	$ 10,304.12	$ 10,248.64	$ 10,269.17	$ 10,364.23	$ 10,532.85	$ 10,649.41	$ 11,021.85
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.

LARGE 018WWR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 17,138.94	$ 17,356.73	$ 17,688.94	$ 17,988.94	$ 17,906.73	$ 17,818.23	$ 18,206.73	$ 18,368.23	$ 18,668.23	$ 20,919.19
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,390.08	$ 18,623.77	$ 18,980.23	$ 19,302.13	$ 19,213.92	$ 19,118.96	$ 19,535.82	$ 19,709.11	$ 20,031.01	$ 22,446.29
Net Present Value [$]	$ 499.52	$ 323.23	$ 235.84	$ 120.25	$ 58.82	$ 51.64	$ 57.01	$ 212.77	$ 328.6	$ 890.17
Incremental dollars per GHG saving	$ 4.77	$ 4.82	$ 4.83	$ 4.86	$ 4.88	$ 4.89	$ 4.91	$ 4.95	$ 4.98	$ 5.05
Auxiliary Energy Required Heating [GJ/yr]	61.5	61.3	61.5	61.5	61.3	60.6	61.3	60.6	60.6	61.2
Annual Energy DHW [GJ/yr]	23.7	23.7	22.5	21.7	22.5	23.7	21.6	22.5	21.7	13.5
Annual Energy Space Heating [GJ/yr]	65.1	65	65.1	65.1	65	64.2	65	64.2	64.2	64.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	116.3	116.1	115	114.2	114.9	115.3	114	114.1	113.2	105.7
Design Heating Load [W]	13033.5	13033.4	13002.5	13002.5	13033.4	12888.6	13033.4	12888.6	12888.6	12330.5
Annual Energy Electricity [kWh/yr]	7941.5	7940.7	7941.5	7941.5	7940.7	7936.6	7940.7	7936.6	7936.6	7939.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,060.41	$ 1,060.29	$ 1,060.41	$ 1,060.41	$ 1,060.29	$ 1,059.71	$ 1,060.29	$ 1,059.71	$ 1,059.71	$ 1,060.17
Annual Energy Natural Gas [m3/yr]	2355.7	2351	2321.5	2299.5	2316.9	2329.6	2294.9	2295.5	2273.5	2070.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,016.17	$ 1,014.14	$ 1,001.41	$ 991.92	$ 999.43	$ 1,004.91	$ 989.94	$ 990.2	$ 980.71	$ 893.27
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	18127	20989	18128	18129	20990	21259	20991	21260	21261	35662
Upgrade Package List	Pkg2222102033	Pkg2231101033	Pkg2221102033	Pkg2221102033	Pkg2231101033	Pkg2231102033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3221201033
GHGI [kg/m2]	9	8.98	8.87	8.79	8.85	8.9	8.77	8.77	8.69	7.93
% ICC	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.4	33.3	33.4	33.4	33.3	32.9	33.3	32.9	32.9	33.3
Output: MEUI [kWh/(m2 * yr)]	49.3	49.2	48.6	48.2	48.5	48.8	48.1	48.1	47.6	43.5
Output: Better than ERS (%)	2100.0%	2110.0%	2190.0%	2240.0%	2190.0%	2170.0%	2260.0%	2250.0%	2310.0%	2540.0%
Output: Better than Envelope (%)	1920.0%	1940.0%	1920.0%	1920.0%	1940.0%	2040.0%	1940.0%	2040.0%	2040.0%	1960.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	757	758	757	757	758	762	758	762	762	758
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 106.69	$ 106.81	$ 106.69	$ 106.69	$ 106.81	$ 107.39	$ 106.81	$ 107.39	$ 107.39	$ 106.93
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 107.07	$ 107.19	$ 107.07	$ 107.07	$ 107.19	$ 107.77	$ 107.19	$ 107.77	$ 107.77	$ 107.31
Annual savings in GHG from electricity savings [kg CO2e/year]	8.3	8.3	8.3	8.3	8.3	8.4	8.3	8.4	8.4	8.3
Annual savings in natural gas [m3/year]	69.79	69.97	71.07	71.89	71.24	70.77	72.06	72.04	72.86	80.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 646.64	$ 648.26	$ 658.44	$ 666.04	$ 660.03	$ 655.65	$ 667.62	$ 667.42	$ 675.01	$ 744.98
Annual savings in carbon tax for natural gas [$/year]	$ 161.4	$ 161.8	$ 164.34	$ 166.24	$ 164.74	$ 163.65	$ 166.64	$ 166.58	$ 168.48	$ 185.94
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 808.03	$ 810.06	$ 822.79	$ 832.28	$ 824.77	$ 819.29	$ 834.26	$ 834.	$ 843.49	$ 930.93
Annual savings in GHG from natural gas savings [kg CO2e/year]	3586.6	3595.6	3652.1	3694.2	3660.9	3636.6	3703	3701.9	3744	4132.1
Net Present Value [$]	$ 499.52	$ 323.23	$ 235.84	$ 120.25	$ 58.82	$ 51.64	$ 57.01	$ 212.77	$ 328.6	$ 890.17
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.

LARGE 018WWR Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 44,812.77	$ 45,362.77	$ 45,451.77	$ 45,464.73	$ 45,644.02	$ 45,662.77	$ 46,001.77	$ 46,014.73	$ 46,103.73	$ 46,144.02
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 48,084.1	$ 48,674.25	$ 48,769.75	$ 48,783.66	$ 48,976.03	$ 48,996.15	$ 49,359.9	$ 49,373.81	$ 49,469.3	$ 49,512.53
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,683.08	$ 28,697.36	$ 28,857.98	$ 28,424.07	$ 28,946.51	$ 28,961.04	$ 29,336.36	$ 29,125.55
Incremental dollars per GHG saving	$ 6.57	$ 6.59	$ 6.67	$ 6.67	$ 6.7	$ 6.59	$ 6.68	$ 6.69	$ 6.76	$ 6.77
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.9	39.9	39.7	39.7	39.9	39.9	39.7	39.7	38.9
Annual Energy DHW [GJ/yr]	23.8	22.5	23.8	23.8	23.8	21.7	22.5	22.5	23.8	23.8
Annual Energy Space Heating [GJ/yr]	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	73.7	72.4	73.7	73.7	73.7	71.6	72.4	72.4	73.7	73.3
Design Heating Load [W]	9901.8	9901.8	9901.8	9930.7	9845.9	9901.8	9901.8	9930.7	9930.7	9816.7
Annual Energy Electricity [kWh/yr]	13866.7	13866.7	13866.7	13866	13859.7	13866.7	13866.7	13866	13866	13769.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,898.82	$ 1,898.82	$ 1,898.82	$ 1,898.72	$ 1,897.83	$ 1,898.82	$ 1,898.82	$ 1,898.72	$ 1,898.72	$ 1,885.06
Annual Energy Natural Gas [m3/yr]	638.4	604.2	638.4	638.8	638.5	582.3	604.2	604.6	638.8	638.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.38	$ 260.63	$ 275.38	$ 275.56	$ 275.43	$ 251.18	$ 260.63	$ 260.8	$ 275.56	$ 275.43
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51652	51653	51940	51220	51778	51654	51941	51221	51508	51796
Upgrade Package List	Pkg4331302054	Pkg4331302054	Pkg4331402054	Pkg4321303054	Pkg4331303053	Pkg4331302054	Pkg4331402054	Pkg4321303054	Pkg4321403054	Pkg4331303054
GHGI [kg/m2]	2.69	2.56	2.69	2.69	2.69	2.48	2.56	2.56	2.69	2.69
% ICC	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.1%	4.1%	4.1%	4.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.6	21.6	21.7	21.7	21.6	21.6	21.1
Output: MEUI [kWh/(m2 * yr)]	25.6	24.9	25.6	25.6	25.6	24.5	24.9	24.9	25.6	25.4
Output: Better than ERS (%)	5120.0%	5200.0%	5120.0%	5120.0%	5120.0%	5260.0%	5200.0%	5200.0%	5120.0%	5140.0%
Output: Better than Envelope (%)	4760.0%	4760.0%	4760.0%	4780.0%	4780.0%	4760.0%	4760.0%	4780.0%	4780.0%	4890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5168	5168	5168	5168	5162	5168	5168	5168	5168	5071
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 728.76	$ 728.76	$ 728.76	$ 728.66	$ 727.77	$ 728.76	$ 728.76	$ 728.66	$ 728.66	$ 715.04
Annual savings in carbon tax for electricity [$/year]	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.54
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 731.34	$ 731.34	$ 731.34	$ 731.24	$ 730.35	$ 731.34	$ 731.34	$ 731.24	$ 731.24	$ 717.57
Annual savings in GHG from electricity savings [kg CO2e/year]	56.9	56.9	56.9	56.8	56.8	56.9	56.9	56.8	56.8	55.8
Annual savings in natural gas [m3/year]	133.78	135.05	133.78	133.76	133.77	135.87	135.05	135.04	133.76	133.77
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,239.45	$ 1,251.26	$ 1,239.45	$ 1,239.32	$ 1,239.42	$ 1,258.82	$ 1,251.26	$ 1,251.12	$ 1,239.32	$ 1,239.42
Annual savings in carbon tax for natural gas [$/year]	$ 309.36	$ 312.31	$ 309.36	$ 309.33	$ 309.35	$ 314.2	$ 312.31	$ 312.27	$ 309.33	$ 309.35
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,548.82	$ 1,563.57	$ 1,548.82	$ 1,548.64	$ 1,548.77	$ 1,573.02	$ 1,563.57	$ 1,563.4	$ 1,548.64	$ 1,548.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	6874.7	6940.2	6874.7	6873.9	6874.5	6982.1	6940.2	6939.4	6873.9	6874.5
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,683.08	$ 28,697.36	$ 28,857.98	$ 28,424.07	$ 28,946.51	$ 28,961.04	$ 29,336.36	$ 29,125.55
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	14.09	14.09	10.47	10.47	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.	$ 550.	$.	$.

LARGE 018WWR Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 44,812.77	$ 45,362.77	$ 45,662.77	$ 45,451.77	$ 45,464.73	$ 46,001.77	$ 46,014.73	$ 46,301.77	$ 46,314.73	$ 45,644.02
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 48,084.1	$ 48,674.25	$ 48,996.15	$ 48,769.75	$ 48,783.66	$ 49,359.9	$ 49,373.81	$ 49,681.8	$ 49,695.71	$ 48,976.03
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,424.07	$ 28,683.08	$ 28,697.36	$ 28,946.51	$ 28,961.04	$ 29,063.07	$ 29,076.63	$ 28,857.98
Incremental dollars per GHG saving	$ 6.57	$ 6.59	$ 6.59	$ 6.67	$ 6.67	$ 6.68	$ 6.69	$ 6.69	$ 6.69	$ 6.7
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.9	39.9	39.9	39.7	39.9	39.7	39.9	39.7	39.7
Annual Energy DHW [GJ/yr]	23.8	22.5	21.7	23.8	23.8	22.5	22.5	21.7	21.7	23.8
Annual Energy Space Heating [GJ/yr]	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	73.7	72.4	71.6	73.7	73.7	72.4	72.4	71.6	71.6	73.7
Design Heating Load [W]	9901.8	9901.8	9901.8	9901.8	9930.7	9901.8	9930.7	9901.8	9930.7	9845.9
Annual Energy Electricity [kWh/yr]	13866.7	13866.7	13866.7	13866.7	13866	13866.7	13866	13866.7	13866	13859.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,898.82	$ 1,898.82	$ 1,898.82	$ 1,898.82	$ 1,898.72	$ 1,898.82	$ 1,898.72	$ 1,898.82	$ 1,898.72	$ 1,897.83
Annual Energy Natural Gas [m3/yr]	638.4	604.2	582.3	638.4	638.8	604.2	604.6	582.3	582.6	638.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.38	$ 260.63	$ 251.18	$ 275.38	$ 275.56	$ 260.63	$ 260.8	$ 251.18	$ 251.31	$ 275.43
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51652	51653	51654	51940	51220	51941	51221	51942	51222	51778
Upgrade Package List	Pkg4331302054	Pkg4331302054	Pkg4331302054	Pkg4331402054	Pkg4321303054	Pkg4331402054	Pkg4321303054	Pkg4331402054	Pkg4321303054	Pkg4331303053
GHGI [kg/m2]	2.69	2.56	2.48	2.69	2.69	2.56	2.56	2.48	2.48	2.69
% ICC	4.0%	4.0%	4.0%	4.0%	4.0%	4.1%	4.1%	4.1%	4.1%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.7	21.6	21.7	21.6	21.7	21.6	21.6
Output: MEUI [kWh/(m2 * yr)]	25.6	24.9	24.5	25.6	25.6	24.9	24.9	24.5	24.5	25.6
Output: Better than ERS (%)	5120.0%	5200.0%	5260.0%	5120.0%	5120.0%	5200.0%	5200.0%	5260.0%	5260.0%	5120.0%
Output: Better than Envelope (%)	4760.0%	4760.0%	4760.0%	4760.0%	4780.0%	4760.0%	4780.0%	4760.0%	4780.0%	4780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5168	5168	5168	5168	5168	5168	5168	5168	5168	5162
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 728.76	$ 728.76	$ 728.76	$ 728.76	$ 728.66	$ 728.76	$ 728.66	$ 728.76	$ 728.66	$ 727.77
Annual savings in carbon tax for electricity [$/year]	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 731.34	$ 731.34	$ 731.34	$ 731.34	$ 731.24	$ 731.34	$ 731.24	$ 731.34	$ 731.24	$ 730.35
Annual savings in GHG from electricity savings [kg CO2e/year]	56.9	56.9	56.9	56.9	56.8	56.9	56.8	56.9	56.8	56.8
Annual savings in natural gas [m3/year]	133.78	135.05	135.87	133.78	133.76	135.05	135.04	135.87	135.86	133.77
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,239.45	$ 1,251.26	$ 1,258.82	$ 1,239.45	$ 1,239.32	$ 1,251.26	$ 1,251.12	$ 1,258.82	$ 1,258.72	$ 1,239.42
Annual savings in carbon tax for natural gas [$/year]	$ 309.36	$ 312.31	$ 314.2	$ 309.36	$ 309.33	$ 312.31	$ 312.27	$ 314.2	$ 314.17	$ 309.35
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,548.82	$ 1,563.57	$ 1,573.02	$ 1,548.82	$ 1,548.64	$ 1,563.57	$ 1,563.4	$ 1,573.02	$ 1,572.89	$ 1,548.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	6874.7	6940.2	6982.1	6874.7	6873.9	6940.2	6939.4	6982.1	6981.6	6874.5
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,424.07	$ 28,683.08	$ 28,697.36	$ 28,946.51	$ 28,961.04	$ 29,063.07	$ 29,076.63	$ 28,857.98
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	14.09	10.47	14.09	10.47	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.

LARGE 018WWR Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 44,812.77	$ 45,362.77	$ 45,662.77	$ 45,451.77	$ 45,464.73	$ 45,644.02	$ 46,001.77	$ 46,014.73	$ 46,301.77	$ 46,314.73
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 48,084.1	$ 48,674.25	$ 48,996.15	$ 48,769.75	$ 48,783.66	$ 48,976.03	$ 49,359.9	$ 49,373.81	$ 49,681.8	$ 49,695.71
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,424.07	$ 28,683.08	$ 28,697.36	$ 28,857.98	$ 28,946.51	$ 28,961.04	$ 29,063.07	$ 29,076.63
Incremental dollars per GHG saving	$ 6.57	$ 6.59	$ 6.59	$ 6.67	$ 6.67	$ 6.7	$ 6.68	$ 6.69	$ 6.69	$ 6.69
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.9	39.9	39.9	39.7	39.7	39.9	39.7	39.9	39.7
Annual Energy DHW [GJ/yr]	23.8	22.5	21.7	23.8	23.8	23.8	22.5	22.5	21.7	21.7
Annual Energy Space Heating [GJ/yr]	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	73.7	72.4	71.6	73.7	73.7	73.7	72.4	72.4	71.6	71.6
Design Heating Load [W]	9901.8	9901.8	9901.8	9901.8	9930.7	9845.9	9901.8	9930.7	9901.8	9930.7
Annual Energy Electricity [kWh/yr]	13866.7	13866.7	13866.7	13866.7	13866	13859.7	13866.7	13866	13866.7	13866
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,898.82	$ 1,898.82	$ 1,898.82	$ 1,898.82	$ 1,898.72	$ 1,897.83	$ 1,898.82	$ 1,898.72	$ 1,898.82	$ 1,898.72
Annual Energy Natural Gas [m3/yr]	638.4	604.2	582.3	638.4	638.8	638.5	604.2	604.6	582.3	582.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.38	$ 260.63	$ 251.18	$ 275.38	$ 275.56	$ 275.43	$ 260.63	$ 260.8	$ 251.18	$ 251.31
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51652	51653	51654	51940	51220	51778	51941	51221	51942	51222
Upgrade Package List	Pkg4331302054	Pkg4331302054	Pkg4331302054	Pkg4331402054	Pkg4321303054	Pkg4331303053	Pkg4331402054	Pkg4321303054	Pkg4331402054	Pkg4321303054
GHGI [kg/m2]	2.69	2.56	2.48	2.69	2.69	2.69	2.56	2.56	2.48	2.48
% ICC	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.1%	4.1%	4.1%	4.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	21.7	21.7	21.7	21.7	21.6	21.6	21.7	21.6	21.7	21.6
Output: MEUI [kWh/(m2 * yr)]	25.6	24.9	24.5	25.6	25.6	25.6	24.9	24.9	24.5	24.5
Output: Better than ERS (%)	5120.0%	5200.0%	5260.0%	5120.0%	5120.0%	5120.0%	5200.0%	5200.0%	5260.0%	5260.0%
Output: Better than Envelope (%)	4760.0%	4760.0%	4760.0%	4760.0%	4780.0%	4780.0%	4760.0%	4780.0%	4760.0%	4780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5168	5168	5168	5168	5168	5162	5168	5168	5168	5168
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 728.76	$ 728.76	$ 728.76	$ 728.76	$ 728.66	$ 727.77	$ 728.76	$ 728.66	$ 728.76	$ 728.66
Annual savings in carbon tax for electricity [$/year]	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 731.34	$ 731.34	$ 731.34	$ 731.34	$ 731.24	$ 730.35	$ 731.34	$ 731.24	$ 731.34	$ 731.24
Annual savings in GHG from electricity savings [kg CO2e/year]	56.9	56.9	56.9	56.9	56.8	56.8	56.9	56.8	56.9	56.8
Annual savings in natural gas [m3/year]	133.78	135.05	135.87	133.78	133.76	133.77	135.05	135.04	135.87	135.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,239.45	$ 1,251.26	$ 1,258.82	$ 1,239.45	$ 1,239.32	$ 1,239.42	$ 1,251.26	$ 1,251.12	$ 1,258.82	$ 1,258.72
Annual savings in carbon tax for natural gas [$/year]	$ 309.36	$ 312.31	$ 314.2	$ 309.36	$ 309.33	$ 309.35	$ 312.31	$ 312.27	$ 314.2	$ 314.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,548.82	$ 1,563.57	$ 1,573.02	$ 1,548.82	$ 1,548.64	$ 1,548.77	$ 1,563.57	$ 1,563.4	$ 1,573.02	$ 1,572.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	6874.7	6940.2	6982.1	6874.7	6873.9	6874.5	6940.2	6939.4	6982.1	6981.6
Net Present Value [$]	$ 28,044.08	$ 28,307.51	$ 28,424.07	$ 28,683.08	$ 28,697.36	$ 28,857.98	$ 28,946.51	$ 28,961.04	$ 29,063.07	$ 29,076.63
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	14.09	14.09	10.47	14.09	10.47	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE 018WWR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,071.73	$ 12,533.23	$ 12,621.73	$ 12,671.73	$ 12,751.02	$ 12,921.73	$ 13,083.23	$ 13,133.23	$ 13,212.52	$ 13,221.73
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 13,592.77	$ 14,112.42	$ 14,212.07	$ 14,268.37	$ 14,357.65	$ 14,549.87	$ 14,731.72	$ 14,788.02	$ 14,877.3	$ 14,887.67
Net Present Value [$]	$ 9,132.53	$ 8,917.66	$ 8,900.15	$ 10,369.87	$ 8,745.74	$ 8,806.89	$ 8,685.05	$ 10,155.74	$ 8,530.63	$ 10,088.73
Incremental dollars per GHG saving	$ 2.83	$ 2.91	$ 2.91	$ 2.7	$ 2.95	$ 2.95	$ 2.98	$ 2.77	$ 3.02	$ 2.78
Auxiliary Energy Required Heating [GJ/yr]	100.8	99.8	100.8	102.9	99.7	100.8	99.8	101.9	98.7	102.9
Annual Energy DHW [GJ/yr]	24.7	24.7	23.3	14.3	24.7	22.4	23.3	14.3	24.7	13
Annual Energy Space Heating [GJ/yr]	106.8	105.8	106.8	109	105.6	106.8	105.8	107.9	104.5	109
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	158.3	157.2	156.8	150	157	155.9	155.8	148.9	156	148.8
Design Heating Load [W]	19158.3	18970.5	19158.3	18868.7	19025	19158.3	18970.5	18680.9	18837.1	18868.7
Annual Energy Electricity [kWh/yr]	7962.5	7957.2	7962.5	7973.4	7956.3	7962.5	7957.2	7968.1	7951	7973.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,063.38	$ 1,062.63	$ 1,063.38	$ 1,064.92	$ 1,062.5	$ 1,063.38	$ 1,062.63	$ 1,064.17	$ 1,061.75	$ 1,064.92
Annual Energy Natural Gas [m3/yr]	3480	3452.2	3442.1	3257.3	3447	3417.4	3414.3	3229.4	3419.2	3225.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,501.15	$ 1,489.16	$ 1,484.8	$ 1,405.09	$ 1,486.92	$ 1,474.15	$ 1,472.81	$ 1,393.05	$ 1,474.92	$ 1,391.24
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11449	11719	11450	11452	13069	11451	11720	11722	13339	11453
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2131102031	Pkg2121101031
GHGI [kg/m2]	13.21	13.11	13.07	12.38	13.09	12.98	12.96	12.27	12.98	12.26
% ICC	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	54.8	54.3	54.8	55.9	54.2	54.8	54.3	55.4	53.6	55.9
Output: MEUI [kWh/(m2 * yr)]	72.1	71.5	71.3	67.6	71.4	70.8	70.8	67	70.8	67
Output: Better than ERS (%)	1620.0%	1680.0%	1700.0%	1810.0%	1690.0%	1750.0%	1750.0%	1870.0%	1740.0%	1880.0%
Output: Better than Envelope (%)	20.0%	80.0%	20.0%	230.0%	90.0%	20.0%	80.0%	130.0%	190.0%	230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1014	1019	1014	1003	1020	1014	1019	1008	1026	1003
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 142.99	$ 143.74	$ 142.99	$ 141.45	$ 143.86	$ 142.99	$ 143.74	$ 142.2	$ 144.61	$ 141.45
Annual savings in carbon tax for electricity [$/year]	$ .51	$ .51	$ .51	$ .5	$ .51	$ .51	$ .51	$ .5	$ .51	$ .5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 143.5	$ 144.25	$ 143.5	$ 141.95	$ 144.37	$ 143.5	$ 144.25	$ 142.7	$ 145.12	$ 141.95
Annual savings in GHG from electricity savings [kg CO2e/year]	11.2	11.2	11.2	11	11.2	11.2	11.2	11.1	11.3	11
Annual savings in natural gas [m3/year]	82.71	83.74	84.12	91	83.94	85.04	85.16	92.04	84.97	92.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 766.28	$ 775.88	$ 779.37	$ 843.16	$ 777.68	$ 787.89	$ 788.96	$ 852.79	$ 787.27	$ 854.24
Annual savings in carbon tax for natural gas [$/year]	$ 191.26	$ 193.66	$ 194.53	$ 210.45	$ 194.1	$ 196.65	$ 196.92	$ 212.85	$ 196.5	$ 213.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 957.54	$ 969.54	$ 973.89	$ 1,053.61	$ 971.78	$ 984.55	$ 985.89	$ 1,065.64	$ 983.77	$ 1,067.46
Annual savings in GHG from natural gas savings [kg CO2e/year]	4250.2	4303.5	4322.8	4676.6	4313.4	4370.1	4376	4730.1	4366.7	4738.1
Net Present Value [$]	$ 9,132.53	$ 8,917.66	$ 8,900.15	$ 10,369.87	$ 8,745.74	$ 8,806.89	$ 8,685.05	$ 10,155.74	$ 8,530.63	$ 10,088.73
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 550.

LARGE 018WWR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,821.73	$ 17,057.23	$ 15,221.73	$ 17,275.02	$ 16,371.73	$ 16,283.23	$ 17,445.73	$ 17,607.23	$ 16,501.02	$ 16,671.73
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,815.27	$ 19,206.44	$ 17,139.67	$ 19,451.67	$ 18,434.57	$ 18,334.92	$ 19,643.89	$ 19,825.74	$ 18,580.15	$ 18,772.37
Net Present Value [$]	$ 1,142.93	$ 3,740.66	$ 236.	$ 3,884.87	$ 860.56	$ 912.04	$ 3,517.51	$ 3,783.63	$ 771.48	$ 734.47
Incremental dollars per GHG saving	$ 1.57	$ 1.58	$ 1.6	$ 1.61	$ 1.62	$ 1.62	$ 1.62	$ 1.64	$ 1.64	$ 1.64
Auxiliary Energy Required Heating [GJ/yr]	102.6	106.2	100.6	106	102.6	101.6	106.7	105.9	101.5	102.6
Annual Energy DHW [GJ/yr]	14.3	8.2	24.7	8.2	13	14.3	7.2	7.6	14.3	12.3
Annual Energy Space Heating [GJ/yr]	40.7	42	40.1	41.9	40.7	40.4	42.2	42	40.3	40.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	85.1	80.5	95.1	80.4	83.9	84.8	79.6	79.7	84.7	83.1
Design Heating Load [W]	18944.3	19047	19234.8	19101.4	18944.3	18756.5	19234.8	19047	18810.9	18944.3
Annual Energy Electricity [kWh/yr]	19686.7	22348.9	19539.5	22320.3	19687.8	19597.1	22111.3	22151.9	19567.1	19688.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,722.35	$ 3,099.05	$ 2,701.52	$ 3,095.01	$ 2,722.51	$ 2,709.67	$ 3,065.43	$ 3,071.18	$ 2,705.43	$ 2,722.62
Annual Energy Natural Gas [m3/yr]	382.7	0	664.2	0	350.4	382.7	0	0	382.7	329.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$.	$ 286.51	$.	$ 151.15	$ 165.08	$.	$.	$ 165.08	$ 142.09
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11734	11458	13084	11462	11731	11466	11735	13081	11463
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031
GHGI [kg/m2]	1.86	0.48	2.91	0.48	1.74	1.86	0.48	0.48	1.86	1.66
% ICC	1.4%	1.5%	1.4%	1.5%	1.5%	1.4%	1.5%	1.6%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55.8	57.7	54.7	57.6	55.8	55.2	58	57.5	55.2	55.8
Output: MEUI [kWh/(m2 * yr)]	32	29.5	37.4	29.4	31.4	31.9	29	29.1	31.8	31
Output: Better than ERS (%)	5310.0%	5580.0%	4930.0%	5580.0%	5380.0%	5330.0%	5630.0%	5620.0%	5330.0%	5420.0%
Output: Better than Envelope (%)	200.0%	560.0%	0.0%	540.0%	200.0%	100.0%	610.0%	530.0%	90.0%	200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10710	13372	10563	13344	10711	10620	13135	13175	10590	10712
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,510.12	$ 1,885.49	$ 1,489.37	$ 1,881.46	$ 1,510.28	$ 1,497.49	$ 1,851.99	$ 1,857.72	$ 1,493.26	$ 1,510.39
Annual savings in carbon tax for electricity [$/year]	$ 5.36	$ 6.69	$ 5.28	$ 6.67	$ 5.36	$ 5.31	$ 6.57	$ 6.59	$ 5.3	$ 5.36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,515.48	$ 1,892.18	$ 1,494.65	$ 1,888.13	$ 1,515.63	$ 1,502.8	$ 1,858.56	$ 1,864.3	$ 1,498.56	$ 1,515.75
Annual savings in GHG from electricity savings [kg CO2e/year]	117.8	147.1	116.2	146.8	117.8	116.8	144.5	144.9	116.5	117.8
Annual savings in natural gas [m3/year]	198.11	212.37	187.62	212.37	199.31	198.11	212.37	212.37	198.11	200.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,835.48	$ 1,967.59	$ 1,738.31	$ 1,967.59	$ 1,846.63	$ 1,835.48	$ 1,967.59	$ 1,967.59	$ 1,835.48	$ 1,853.88
Annual savings in carbon tax for natural gas [$/year]	$ 458.13	$ 491.1	$ 433.87	$ 491.1	$ 460.91	$ 458.13	$ 491.1	$ 491.1	$ 458.13	$ 462.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,293.61	$ 2,458.7	$ 2,172.18	$ 2,458.7	$ 2,307.54	$ 2,293.61	$ 2,458.7	$ 2,458.7	$ 2,293.61	$ 2,316.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	10180.6	10913.4	9641.6	10913.4	10242.5	10180.6	10913.4	10913.4	10180.6	10282.7
Net Present Value [$]	$ 1,142.93	$ 3,740.66	$ 236.	$ 3,884.87	$ 860.56	$ 912.04	$ 3,517.51	$ 3,783.63	$ 771.48	$ 734.47
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.

LARGE 018WWR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 13,351.02	$ 13,521.73	$ 13,683.23	$ 13,812.52	$ 13,983.23	$ 13,901.02	$ 15,477.44
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 14,268.37	$ 14,788.02	$ 14,887.67	$ 15,033.25	$ 15,225.47	$ 15,407.32	$ 15,552.9	$ 15,745.12	$ 15,652.55	$ 17,427.6
Net Present Value [$]	$ 10,369.87	$ 10,155.74	$ 10,088.73	$ 9,981.33	$ 9,962.76	$ 9,874.22	$ 9,766.28	$ 9,748.44	$ 9,699.09	$ 9,592.14
Incremental dollars per GHG saving	$ 2.7	$ 2.77	$ 2.78	$ 2.81	$ 2.82	$ 2.85	$ 2.88	$ 2.89	$ 2.89	$ 3.02
Auxiliary Energy Required Heating [GJ/yr]	102.9	101.9	102.9	101.7	102.9	101.9	100.7	101.9	101.8	94.7
Annual Energy DHW [GJ/yr]	14.3	14.3	13	14.3	12.3	13	14.3	12.3	13	14.3
Annual Energy Space Heating [GJ/yr]	109	107.9	109	107.8	109	108	106.7	108	107.8	100.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	150	148.9	148.8	148.8	148	147.8	147.7	147	147.6	141.3
Design Heating Load [W]	18868.7	18680.9	18868.7	18735.3	18868.7	18680.9	18547.5	18680.9	18735.3	17864.7
Annual Energy Electricity [kWh/yr]	7973.4	7968.1	7973.4	7967.2	7973.5	7968.2	7961.9	7968.2	7967.3	7930.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,064.92	$ 1,064.17	$ 1,064.92	$ 1,064.04	$ 1,064.94	$ 1,064.19	$ 1,063.29	$ 1,064.19	$ 1,064.06	$ 1,058.79
Annual Energy Natural Gas [m3/yr]	3257.3	3229.4	3225.2	3224.5	3204.4	3197.3	3196.7	3176.5	3192.5	3028.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,405.09	$ 1,393.05	$ 1,391.24	$ 1,390.94	$ 1,382.27	$ 1,379.2	$ 1,378.94	$ 1,370.23	$ 1,377.13	$ 1,306.39
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	13072	11454	11723	13342	11724	13073	17824
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121102031	Pkg2131101031	Pkg2221101031
GHGI [kg/m2]	12.38	12.27	12.26	12.25	12.18	12.15	12.15	12.07	12.13	11.52
% ICC	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	55.9	55.4	55.9	55.3	56	55.4	54.8	55.4	55.3	51.5
Output: MEUI [kWh/(m2 * yr)]	67.6	67	67	66.9	66.5	66.4	66.4	66	66.3	62.9
Output: Better than ERS (%)	1810.0%	1870.0%	1880.0%	1880.0%	1920.0%	1930.0%	1940.0%	1980.0%	1940.0%	2290.0%
Output: Better than Envelope (%)	230.0%	130.0%	230.0%	110.0%	230.0%	130.0%	10.0%	130.0%	120.0%	590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1003	1008	1003	1009	1003	1008	1015	1008	1009	1046
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 141.45	$ 142.2	$ 141.45	$ 142.33	$ 141.44	$ 142.18	$ 143.07	$ 142.18	$ 142.31	$ 147.56
Annual savings in carbon tax for electricity [$/year]	$ .5	$ .5	$ .5	$ .5	$ .5	$ .5	$ .51	$ .5	$ .5	$ .52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 141.95	$ 142.7	$ 141.95	$ 142.83	$ 141.94	$ 142.69	$ 143.58	$ 142.69	$ 142.82	$ 148.08
Annual savings in GHG from electricity savings [kg CO2e/year]	11	11.1	11	11.1	11	11.1	11.2	11.1	11.1	11.5
Annual savings in natural gas [m3/year]	91	92.04	92.2	92.23	92.98	93.24	93.26	94.02	93.42	99.53
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 843.16	$ 852.79	$ 854.24	$ 854.48	$ 861.42	$ 863.87	$ 864.08	$ 871.05	$ 865.53	$ 922.14
Annual savings in carbon tax for natural gas [$/year]	$ 210.45	$ 212.85	$ 213.21	$ 213.27	$ 215.01	$ 215.62	$ 215.67	$ 217.41	$ 216.03	$ 230.16
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,053.61	$ 1,065.64	$ 1,067.46	$ 1,067.76	$ 1,076.43	$ 1,079.49	$ 1,079.75	$ 1,088.46	$ 1,081.56	$ 1,152.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	4676.6	4730.1	4738.1	4739.4	4777.9	4791.5	4792.7	4831.3	4800.7	5114.7
Net Present Value [$]	$ 10,369.87	$ 10,155.74	$ 10,088.73	$ 9,981.33	$ 9,962.76	$ 9,874.22	$ 9,766.28	$ 9,748.44	$ 9,699.09	$ 9,592.14
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.

LARGE 018WWR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,789.67	$ 22,811.17	$ 22,899.67	$ 22,948.48	$ 23,028.96	$ 23,029.19	$ 23,109.98	$ 23,199.67	$ 23,251.17	$ 23,289.67
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,661.17	$ 25,685.38	$ 25,785.03	$ 25,839.99	$ 25,930.61	$ 25,930.87	$ 26,021.84	$ 26,122.83	$ 26,180.82	$ 26,224.17
Net Present Value [$]	$ 5,690.88	$ 5,486.81	$ 5,420.9	$ 5,175.54	$ 5,305.24	$ 3,935.71	$ 5,084.57	$ 5,295.48	$ 5,474.07	$ 5,468.27
Incremental dollars per GHG saving	$ 3.82	$ 3.85	$ 3.86	$ 3.89	$ 3.88	$ 2.41	$ 3.91	$ 3.88	$ 3.86	$ 3.87
Auxiliary Energy Required Heating [GJ/yr]	79	79.7	80.7	82.2	79.6	84	81.2	80.7	78	77.9
Annual Energy DHW [GJ/yr]	14.3	14.3	13	12.3	14.3	24.7	13	12.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	83.7	84.5	85.5	87.1	84.3	33.7	86.1	85.5	82.6	82.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	125.3	126.1	126	126.8	126	89.3	126.5	125.2	124.3	124.2
Design Heating Load [W]	15340.2	15329	15516.8	15859.2	15383.4	16566.2	15671.4	15516.8	15152.4	15302.3
Annual Energy Electricity [kWh/yr]	8034.2	8038.1	8043.3	8051.3	8037.3	17943	8046	8043.4	8028.9	8028.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,073.52	$ 1,074.08	$ 1,074.81	$ 1,075.94	$ 1,073.96	$ 2,475.62	$ 1,075.19	$ 1,074.83	$ 1,072.77	$ 1,072.68
Annual Energy Natural Gas [m3/yr]	2589.3	2609.9	2605.6	2626.6	2605.8	664.5	2619.8	2584.7	2561.7	2558
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,116.93	$ 1,125.82	$ 1,123.97	$ 1,133.02	$ 1,124.05	$ 286.64	$ 1,130.09	$ 1,114.95	$ 1,105.03	$ 1,103.43
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43438	43636	43421	37626	45364	35650	37841	43422	43654	43456
Upgrade Package List	Pkg3321201033	Pkg3321202032	Pkg3321201032	Pkg3231201034	Pkg3331201032	Pkg3221201032	Pkg3231202034	Pkg3321201032	Pkg3321202033	Pkg3321201034
GHGI [kg/m2]	9.88	9.95	9.94	10.02	9.94	2.88	9.99	9.86	9.77	9.76
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	42.9	43.3	43.9	44.7	43.3	45.7	44.2	43.9	42.4	42.3
Output: MEUI [kWh/(m2 * yr)]	54.2	54.6	54.6	55	54.6	34.3	54.9	54.1	53.6	53.6
Output: Better than ERS (%)	3160.0%	3120.0%	3120.0%	3080.0%	3120.0%	5230.0%	3090.0%	3170.0%	3220.0%	3220.0%
Output: Better than Envelope (%)	2150.0%	2080.0%	1980.0%	1830.0%	2090.0%	1650.0%	1930.0%	1980.0%	2250.0%	2260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	942	938	933	925	939	8966	931	933	948	948
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 132.88	$ 132.33	$ 131.6	$ 130.47	$ 132.44	$ 1,264.26	$ 131.21	$ 131.58	$ 133.63	$ 133.72
Annual savings in carbon tax for electricity [$/year]	$ .47	$ .47	$ .47	$ .46	$ .47	$ 4.48	$ .47	$ .47	$ .47	$ .47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 133.35	$ 132.8	$ 132.06	$ 130.93	$ 132.91	$ 1,268.75	$ 131.68	$ 132.05	$ 134.1	$ 134.2
Annual savings in GHG from electricity savings [kg CO2e/year]	10.4	10.3	10.3	10.2	10.3	98.6	10.2	10.3	10.4	10.4
Annual savings in natural gas [m3/year]	115.89	115.13	115.29	114.5	115.28	187.61	114.76	116.07	116.92	117.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,073.76	$ 1,066.65	$ 1,068.13	$ 1,060.88	$ 1,068.06	$ 1,738.21	$ 1,063.23	$ 1,075.34	$ 1,083.28	$ 1,084.56
Annual savings in carbon tax for natural gas [$/year]	$ 268.	$ 266.23	$ 266.6	$ 264.79	$ 266.58	$ 433.85	$ 265.38	$ 268.4	$ 270.38	$ 270.7
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,341.76	$ 1,332.88	$ 1,334.73	$ 1,325.67	$ 1,334.64	$ 2,172.05	$ 1,328.6	$ 1,343.75	$ 1,353.67	$ 1,355.26
Annual savings in GHG from natural gas savings [kg CO2e/year]	5955.7	5916.2	5924.4	5884.2	5924.1	9641.1	5897.3	5964.5	6008.5	6015.6
Net Present Value [$]	$ 5,690.88	$ 5,486.81	$ 5,420.9	$ 5,175.54	$ 5,305.24	$ 3,935.71	$ 5,084.57	$ 5,295.48	$ 5,474.07	$ 5,468.27
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	5.28	5.28	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 8,845.78	$ 10,716.26	$ 8,845.78	$ 8,845.78	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$ 3,150.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.	$.	$.

LARGE 018WWR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 24,069.19	$ 23,029.19	$ 24,619.19	$ 24,530.69	$ 24,569.19	$ 24,919.19	$ 23,579.19	$ 24,748.48	$ 24,769.98	$ 23,469.19
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 27,101.91	$ 25,930.87	$ 27,721.21	$ 27,621.56	$ 27,664.91	$ 28,059.01	$ 26,550.17	$ 27,866.79	$ 27,891.	$ 26,426.31
Net Present Value [$]	$ 2,558.71	$ 3,935.71	$ 2,840.9	$ 2,781.02	$ 2,777.71	$ 2,966.81	$ 4,168.33	$ 2,940.75	$ 3,179.71	$ 3,918.94
Incremental dollars per GHG saving	$ 2.39	$ 2.41	$ 2.43	$ 2.43	$ 2.44	$ 2.45	$ 2.45	$ 2.45	$ 2.46	$ 2.46
Auxiliary Energy Required Heating [GJ/yr]	84.3	84	84.3	83.3	83.1	84.3	84	83.1	83.9	82.3
Annual Energy DHW [GJ/yr]	14.3	24.7	13	14.3	14.3	12.3	23.3	14.3	14.3	24.7
Annual Energy Space Heating [GJ/yr]	33.6	33.7	33.6	33.3	33.2	33.6	33.7	33.2	33.5	33
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	78.8	89.3	77.6	78.4	78.4	76.8	87.9	78.4	78.7	88.7
Design Heating Load [W]	16101.2	16566.2	16101.2	15913.3	16063.3	16101.2	16566.2	15967.8	15956.6	16389.6
Annual Energy Electricity [kWh/yr]	17920.9	17943	17922	17828	17811.8	17922.7	17943	17805.5	17889.9	17765.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,472.49	$ 2,475.62	$ 2,472.65	$ 2,459.35	$ 2,457.05	$ 2,472.75	$ 2,475.62	$ 2,456.16	$ 2,468.11	$ 2,450.46
Annual Energy Natural Gas [m3/yr]	382.7	664.5	350.4	382.7	382.7	329.4	626.6	382.7	382.7	664.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 286.64	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 270.29	$ 165.08	$ 165.08	$ 286.69
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35671	35650	35672	35887	35689	35673	35651	37615	37813	35668
Upgrade Package List	Pkg3221201033	Pkg3221201032	Pkg3221201033	Pkg3221202033	Pkg3221201034	Pkg3221201033	Pkg3221201032	Pkg3231201033	Pkg3231202032	Pkg3221201033
GHGI [kg/m2]	1.82	2.88	1.7	1.82	1.82	1.62	2.73	1.82	1.82	2.87
% ICC	2.1%	2.0%	2.2%	2.2%	2.2%	2.2%	2.1%	2.2%	2.2%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	45.8	45.7	45.8	45.3	45.2	45.8	45.7	45.2	45.6	44.7
Output: MEUI [kWh/(m2 * yr)]	28.6	34.3	27.9	28.4	28.4	27.5	33.6	28.4	28.5	34
Output: Better than ERS (%)	5660.0%	5230.0%	5720.0%	5680.0%	5680.0%	5770.0%	5310.0%	5680.0%	5660.0%	5270.0%
Output: Better than Envelope (%)	1620.0%	1650.0%	1620.0%	1720.0%	1740.0%	1620.0%	1650.0%	1740.0%	1660.0%	1820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8944	8966	8945	8851	8835	8946	8966	8829	8913	8789
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,261.15	$ 1,264.26	$ 1,261.3	$ 1,248.05	$ 1,245.76	$ 1,261.4	$ 1,264.26	$ 1,244.87	$ 1,256.78	$ 1,239.19
Annual savings in carbon tax for electricity [$/year]	$ 4.47	$ 4.48	$ 4.47	$ 4.43	$ 4.42	$ 4.47	$ 4.48	$ 4.41	$ 4.46	$ 4.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,265.62	$ 1,268.75	$ 1,265.77	$ 1,252.47	$ 1,250.18	$ 1,265.87	$ 1,268.75	$ 1,249.29	$ 1,261.23	$ 1,243.59
Annual savings in GHG from electricity savings [kg CO2e/year]	98.4	98.6	98.4	97.4	97.2	98.4	98.6	97.1	98	96.7
Annual savings in natural gas [m3/year]	198.11	187.61	199.31	198.11	198.11	200.1	189.02	198.11	198.11	187.61
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,835.48	$ 1,738.21	$ 1,846.63	$ 1,835.48	$ 1,835.48	$ 1,853.88	$ 1,751.29	$ 1,835.48	$ 1,835.48	$ 1,738.17
Annual savings in carbon tax for natural gas [$/year]	$ 458.13	$ 433.85	$ 460.91	$ 458.13	$ 458.13	$ 462.72	$ 437.11	$ 458.13	$ 458.13	$ 433.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,293.61	$ 2,172.05	$ 2,307.54	$ 2,293.61	$ 2,293.61	$ 2,316.6	$ 2,188.4	$ 2,293.61	$ 2,293.61	$ 2,172.01
Annual savings in GHG from natural gas savings [kg CO2e/year]	10180.6	9641.1	10242.5	10180.6	10180.6	10282.7	9713.6	10180.6	10180.6	9640.9
Net Present Value [$]	$ 2,558.71	$ 3,935.71	$ 2,840.9	$ 2,781.02	$ 2,777.71	$ 2,966.81	$ 4,168.33	$ 2,940.75	$ 3,179.71	$ 3,918.94
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$.

LARGE 018WWR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 22,789.67	$ 22,811.17	$ 23,251.17	$ 23,289.67	$ 22,899.67	$ 23,339.67	$ 23,028.96	$ 23,199.67	$ 23,468.96	$ 23,639.67
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,661.17	$ 25,685.38	$ 26,180.82	$ 26,224.17	$ 25,785.03	$ 26,280.47	$ 25,930.61	$ 26,122.83	$ 26,426.05	$ 26,618.27
Net Present Value [$]	$ 5,690.88	$ 5,486.81	$ 5,474.07	$ 5,468.27	$ 5,420.9	$ 5,408.76	$ 5,305.24	$ 5,295.48	$ 5,291.65	$ 5,282.98
Incremental dollars per GHG saving	$ 3.82	$ 3.85	$ 3.86	$ 3.87	$ 3.86	$ 3.87	$ 3.88	$ 3.88	$ 3.89	$ 3.9
Auxiliary Energy Required Heating [GJ/yr]	79	79.7	78	77.9	80.7	79	79.6	80.7	77.9	79
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	13	14.3	12.3	14.3	12.3
Annual Energy Space Heating [GJ/yr]	83.7	84.5	82.6	82.5	85.5	83.7	84.3	85.5	82.5	83.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	125.3	126.1	124.3	124.2	126	124.2	126	125.2	124.1	123.4
Design Heating Load [W]	15340.2	15329	15152.4	15302.3	15516.8	15340.2	15383.4	15516.8	15206.8	15340.2
Annual Energy Electricity [kWh/yr]	8034.2	8038.1	8028.9	8028.2	8043.3	8034.2	8037.3	8043.4	8028.2	8034.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,073.52	$ 1,074.08	$ 1,072.77	$ 1,072.68	$ 1,074.81	$ 1,073.52	$ 1,073.96	$ 1,074.83	$ 1,072.68	$ 1,073.52
Annual Energy Natural Gas [m3/yr]	2589.3	2609.9	2561.7	2558	2605.6	2557.3	2605.8	2584.7	2557.7	2536.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,116.93	$ 1,125.82	$ 1,105.03	$ 1,103.43	$ 1,123.97	$ 1,103.13	$ 1,124.05	$ 1,114.95	$ 1,103.3	$ 1,094.16
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43438	43636	43654	43456	43421	43439	45364	43422	45382	43440
Upgrade Package List	Pkg3321201033	Pkg3321202032	Pkg3321202033	Pkg3321201034	Pkg3321201032	Pkg3321201033	Pkg3331201032	Pkg3321201032	Pkg3331201033	Pkg3321201033
GHGI [kg/m2]	9.88	9.95	9.77	9.76	9.94	9.76	9.94	9.86	9.76	9.68
% ICC	2.0%	2.0%	2.1%	2.1%	2.0%	2.1%	2.0%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	42.9	43.3	42.4	42.3	43.9	42.9	43.3	43.9	42.3	43
Output: MEUI [kWh/(m2 * yr)]	54.2	54.6	53.6	53.6	54.6	53.6	54.6	54.1	53.6	53.1
Output: Better than ERS (%)	3160.0%	3120.0%	3220.0%	3220.0%	3120.0%	3220.0%	3120.0%	3170.0%	3230.0%	3260.0%
Output: Better than Envelope (%)	2150.0%	2080.0%	2250.0%	2260.0%	1980.0%	2150.0%	2090.0%	1980.0%	2260.0%	2150.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	942	938	948	948	933	942	939	933	948	942
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 132.88	$ 132.33	$ 133.63	$ 133.72	$ 131.6	$ 132.88	$ 132.44	$ 131.58	$ 133.72	$ 132.88
Annual savings in carbon tax for electricity [$/year]	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 133.35	$ 132.8	$ 134.1	$ 134.2	$ 132.06	$ 133.35	$ 132.91	$ 132.05	$ 134.2	$ 133.35
Annual savings in GHG from electricity savings [kg CO2e/year]	10.4	10.3	10.4	10.4	10.3	10.4	10.3	10.3	10.4	10.4
Annual savings in natural gas [m3/year]	115.89	115.13	116.92	117.06	115.29	117.09	115.28	116.07	117.07	117.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,073.76	$ 1,066.65	$ 1,083.28	$ 1,084.56	$ 1,068.13	$ 1,084.8	$ 1,068.06	$ 1,075.34	$ 1,084.67	$ 1,091.98
Annual savings in carbon tax for natural gas [$/year]	$ 268.	$ 266.23	$ 270.38	$ 270.7	$ 266.6	$ 270.76	$ 266.58	$ 268.4	$ 270.73	$ 272.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,341.76	$ 1,332.88	$ 1,353.67	$ 1,355.26	$ 1,334.73	$ 1,355.56	$ 1,334.64	$ 1,343.75	$ 1,355.39	$ 1,364.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	5955.7	5916.2	6008.5	6015.6	5924.4	6016.9	5924.1	5964.5	6016.2	6056.8
Net Present Value [$]	$ 5,690.88	$ 5,486.81	$ 5,474.07	$ 5,468.27	$ 5,420.9	$ 5,408.76	$ 5,305.24	$ 5,295.48	$ 5,291.65	$ 5,282.98
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	8.77	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$.	$ 850.

LARGE 018WWR Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k				
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK				
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55				
Total increase in construction cost [$]	$ 57,630.83	$ 58,180.83	$ 58,269.83	$ 58,480.83	$ 58,819.83	$ 59,119.83				
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 64,892.31	$ 65,511.61	$ 65,611.83	$ 65,849.41	$ 66,231.13	$ 66,568.93				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 30,093.66	$ 29,781.27	$ 30,326.28	$ 30,420.27				
Incremental dollars per GHG saving	$ 6.02	$ 6.03	$ 6.08	$ 6.03	$ 6.09	$ 6.09				
Auxiliary Energy Required Heating [GJ/yr]	53.4	53.4	53.4	53.4	53.4	53.4				
Annual Energy DHW [GJ/yr]	24.7	23.3	24.7	22.4	23.3	22.4				
Annual Energy Space Heating [GJ/yr]	21.8	21.8	21.8	21.8	21.8	21.8				
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6				
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8				
Total Energy [GJ/yr]	76.6	75.2	76.6	74.3	75.2	74.3				
Design Heating Load [W]	11736.1	11736.1	11736.1	11736.1	11736.1	11736.1				
Annual Energy Electricity [kWh/yr]	14415	14415	14415	14415	14415	14415				
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41				
Annual Energy Natural Gas [m3/yr]	664.5	626.6	664.5	602	626.6	602				
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.64	$ 270.29	$ 286.64	$ 259.68	$ 270.29	$ 259.68				
Step Code Level	5	5	5	5	5	5				
HTAP Run Number	52408	52409	52696	52410	52697	52698				
Upgrade Package List	Pkg4341303064	Pkg4341303064	Pkg4341403064	Pkg4341303064	Pkg4341403064	Pkg4341403064				
GHGI [kg/m2]	2.8	2.66	2.8	2.57	2.66	2.57				
% ICC	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%				
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1				
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40				
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45				
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%				
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6				
Output: TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Output: MEUI [kWh/(m2 * yr)]	27.5	26.7	27.5	26.3	26.7	26.3				
Output: Better than ERS (%)	5910.0%	5990.0%	5910.0%	6040.0%	5990.0%	6040.0%				
Output: Better than Envelope (%)	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%				
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5438	5438	5438	5438	5438	5438				
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81				
Annual savings in carbon tax for electricity [$/year]	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72				
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53				
Annual savings in GHG from electricity savings [kg CO2e/year]	59.8	59.8	59.8	59.8	59.8	59.8				
Annual savings in natural gas [m3/year]	187.61	189.02	187.61	189.94	189.02	189.94				
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,738.21	$ 1,751.29	$ 1,738.21	$ 1,759.78	$ 1,751.29	$ 1,759.78				
Annual savings in carbon tax for natural gas [$/year]	$ 433.85	$ 437.11	$ 433.85	$ 439.23	$ 437.11	$ 439.23				
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,172.05	$ 2,188.4	$ 2,172.05	$ 2,199.01	$ 2,188.4	$ 2,199.01				
Annual savings in GHG from natural gas savings [kg CO2e/year]	9641.1	9713.6	9641.1	9760.7	9713.6	9760.7				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 30,093.66	$ 29,781.27	$ 30,326.28	$ 30,420.27				
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09				
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80				
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75				
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67				
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25				
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96				
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff				
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04				
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26				
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11				
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA				
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20				
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,774.75				
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]				
Exposed Floor RSI	0	0	0	0	0	0				
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.				
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP				
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85				
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas				
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55				
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.				
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.				
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.				

LARGE 018WWR Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k				
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK				
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55				
Total increase in construction cost [$]	$ 57,630.83	$ 58,180.83	$ 58,480.83	$ 58,269.83	$ 58,819.83	$ 59,119.83				
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 64,892.31	$ 65,511.61	$ 65,849.41	$ 65,611.83	$ 66,231.13	$ 66,568.93				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 29,781.27	$ 30,093.66	$ 30,326.28	$ 30,420.27				
Incremental dollars per GHG saving	$ 6.02	$ 6.03	$ 6.03	$ 6.08	$ 6.09	$ 6.09				
Auxiliary Energy Required Heating [GJ/yr]	53.4	53.4	53.4	53.4	53.4	53.4				
Annual Energy DHW [GJ/yr]	24.7	23.3	22.4	24.7	23.3	22.4				
Annual Energy Space Heating [GJ/yr]	21.8	21.8	21.8	21.8	21.8	21.8				
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6				
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8				
Total Energy [GJ/yr]	76.6	75.2	74.3	76.6	75.2	74.3				
Design Heating Load [W]	11736.1	11736.1	11736.1	11736.1	11736.1	11736.1				
Annual Energy Electricity [kWh/yr]	14415	14415	14415	14415	14415	14415				
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41				
Annual Energy Natural Gas [m3/yr]	664.5	626.6	602	664.5	626.6	602				
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.64	$ 270.29	$ 259.68	$ 286.64	$ 270.29	$ 259.68				
Step Code Level	5	5	5	5	5	5				
HTAP Run Number	52408	52409	52410	52696	52697	52698				
Upgrade Package List	Pkg4341303064	Pkg4341303064	Pkg4341303064	Pkg4341403064	Pkg4341403064	Pkg4341403064				
GHGI [kg/m2]	2.8	2.66	2.57	2.8	2.66	2.57				
% ICC	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%				
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1				
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40				
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45				
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%				
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6				
Output: TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Output: MEUI [kWh/(m2 * yr)]	27.5	26.7	26.3	27.5	26.7	26.3				
Output: Better than ERS (%)	5910.0%	5990.0%	6040.0%	5910.0%	5990.0%	6040.0%				
Output: Better than Envelope (%)	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%				
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5438	5438	5438	5438	5438	5438				
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81				
Annual savings in carbon tax for electricity [$/year]	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72				
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53				
Annual savings in GHG from electricity savings [kg CO2e/year]	59.8	59.8	59.8	59.8	59.8	59.8				
Annual savings in natural gas [m3/year]	187.61	189.02	189.94	187.61	189.02	189.94				
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,738.21	$ 1,751.29	$ 1,759.78	$ 1,738.21	$ 1,751.29	$ 1,759.78				
Annual savings in carbon tax for natural gas [$/year]	$ 433.85	$ 437.11	$ 439.23	$ 433.85	$ 437.11	$ 439.23				
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,172.05	$ 2,188.4	$ 2,199.01	$ 2,172.05	$ 2,188.4	$ 2,199.01				
Annual savings in GHG from natural gas savings [kg CO2e/year]	9641.1	9713.6	9760.7	9641.1	9713.6	9760.7				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 29,781.27	$ 30,093.66	$ 30,326.28	$ 30,420.27				
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09				
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80				
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75				
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67				
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25				
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96				
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff				
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04				
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26				
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11				
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA				
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20				
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,774.75				
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]				
Exposed Floor RSI	0	0	0	0	0	0				
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.				
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP				
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85				
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas				
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55				
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.				
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.				
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.				

LARGE 018WWR Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k				
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK				
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55				
Total increase in construction cost [$]	$ 57,630.83	$ 58,180.83	$ 58,480.83	$ 58,269.83	$ 58,819.83	$ 59,119.83				
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 64,892.31	$ 65,511.61	$ 65,849.41	$ 65,611.83	$ 66,231.13	$ 66,568.93				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 29,781.27	$ 30,093.66	$ 30,326.28	$ 30,420.27				
Incremental dollars per GHG saving	$ 6.02	$ 6.03	$ 6.03	$ 6.08	$ 6.09	$ 6.09				
Auxiliary Energy Required Heating [GJ/yr]	53.4	53.4	53.4	53.4	53.4	53.4				
Annual Energy DHW [GJ/yr]	24.7	23.3	22.4	24.7	23.3	22.4				
Annual Energy Space Heating [GJ/yr]	21.8	21.8	21.8	21.8	21.8	21.8				
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6				
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8				
Total Energy [GJ/yr]	76.6	75.2	74.3	76.6	75.2	74.3				
Design Heating Load [W]	11736.1	11736.1	11736.1	11736.1	11736.1	11736.1				
Annual Energy Electricity [kWh/yr]	14415	14415	14415	14415	14415	14415				
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41	$ 1,976.41				
Annual Energy Natural Gas [m3/yr]	664.5	626.6	602	664.5	626.6	602				
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.64	$ 270.29	$ 259.68	$ 286.64	$ 270.29	$ 259.68				
Step Code Level	5	5	5	5	5	5				
HTAP Run Number	52408	52409	52410	52696	52697	52698				
Upgrade Package List	Pkg4341303064	Pkg4341303064	Pkg4341303064	Pkg4341403064	Pkg4341403064	Pkg4341403064				
GHGI [kg/m2]	2.8	2.66	2.57	2.8	2.66	2.57				
% ICC	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%				
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1				
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40				
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45				
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%				
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6				
Output: TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29				
Output: MEUI [kWh/(m2 * yr)]	27.5	26.7	26.3	27.5	26.7	26.3				
Output: Better than ERS (%)	5910.0%	5990.0%	6040.0%	5910.0%	5990.0%	6040.0%				
Output: Better than Envelope (%)	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%	4690.0%				
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5438	5438	5438	5438	5438	5438				
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81	$ 766.81				
Annual savings in carbon tax for electricity [$/year]	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72	$ 2.72				
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53	$ 769.53				
Annual savings in GHG from electricity savings [kg CO2e/year]	59.8	59.8	59.8	59.8	59.8	59.8				
Annual savings in natural gas [m3/year]	187.61	189.02	189.94	187.61	189.02	189.94				
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,738.21	$ 1,751.29	$ 1,759.78	$ 1,738.21	$ 1,751.29	$ 1,759.78				
Annual savings in carbon tax for natural gas [$/year]	$ 433.85	$ 437.11	$ 439.23	$ 433.85	$ 437.11	$ 439.23				
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,172.05	$ 2,188.4	$ 2,199.01	$ 2,172.05	$ 2,188.4	$ 2,199.01				
Annual savings in GHG from natural gas savings [kg CO2e/year]	9641.1	9713.6	9760.7	9641.1	9713.6	9760.7				
Net Present Value [$]	$ 29,454.66	$ 29,687.28	$ 29,781.27	$ 30,093.66	$ 30,326.28	$ 30,420.27				
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09				
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80				
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75				
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67				
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25				
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96				
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff				
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04				
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26				
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11				
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA				
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20				
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,774.75				
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]				
Exposed Floor RSI	0	0	0	0	0	0				
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.				
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP				
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85				
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas				
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55				
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.				
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.				
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.				
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.				

LARGE 018WWR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 12,671.73	$ 12,921.73	$ 13,083.23	$ 13,133.23	$ 13,212.52	$ 13,221.73	$ 13,301.02	$ 13,351.02	$ 13,383.23	$ 13,431.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,032.94	$ 19,408.44	$ 19,651.01	$ 19,726.11	$ 19,845.21	$ 19,859.04	$ 19,978.13	$ 20,053.23	$ 20,101.61	$ 20,174.46
Net Present Value [$]	$ 16,267.72	$ 14,633.81	$ 14,543.58	$ 16,130.64	$ 14,402.59	$ 16,039.11	$ 14,371.66	$ 15,956.23	$ 14,495.94	$ 14,156.86
Incremental dollars per GHG saving	$ 2.13	$ 2.29	$ 2.32	$ 2.18	$ 2.34	$ 2.19	$ 2.35	$ 2.21	$ 2.35	$ 2.34
Auxiliary Energy Required Heating [GJ/yr]	142.3	140.5	139.2	141	137.7	142.3	139	140.8	139.2	135.9
Annual Energy DHW [GJ/yr]	15.8	23.9	25	15.8	26.7	14.3	25	15.8	23.9	26.7
Annual Energy Space Heating [GJ/yr]	150.7	148.8	147.5	149.3	145.9	150.7	147.3	149.1	147.5	144
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8
Total Energy [GJ/yr]	193.3	199.5	199.2	191.9	199.3	191.8	199	191.7	198.1	198.1
Design Heating Load [W]	23056.3	23465.5	23242.4	22833.3	23086.5	23056.3	23309.6	22900.4	23242.4	22641.4
Annual Energy Electricity [kWh/yr]	8186	8176.7	8169.7	8179.1	8161.9	8186.1	8168.9	8178.2	8169.7	8334.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,095.	$ 1,093.69	$ 1,092.7	$ 1,094.03	$ 1,091.59	$ 1,095.02	$ 1,092.58	$ 1,093.9	$ 1,092.7	$ 1,116.07
Annual Energy Natural Gas [m3/yr]	4398.2	4566.3	4559.9	4361.6	4563.7	4359.8	4554.7	4356.7	4529.8	4513.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,897.23	$ 1,969.74	$ 1,966.98	$ 1,881.44	$ 1,968.62	$ 1,880.67	$ 1,964.74	$ 1,879.33	$ 1,954.	$ 1,947.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116860	116859	117128	117130	118747	116861	118478	118480	117129	116875
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2131102031	Pkg2121101031	Pkg2131101031	Pkg2131101031	Pkg2121102031	Pkg2121101032
GHGI [kg/m2]	16.66	17.29	17.26	16.52	17.28	16.51	17.24	16.5	17.15	17.09
% ICC	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.3	76.4	75.7	76.6	74.9	77.4	75.6	76.5	75.7	73.9
Output: MEUI [kWh/(m2 * yr)]	91.1	94.5	94.4	90.4	94.4	90.3	94.3	90.3	93.8	93.8
Output: Better than ERS (%)	1890.0%	1840.0%	1860.0%	1950.0%	1850.0%	1950.0%	1860.0%	1960.0%	1900.0%	1900.0%
Output: Better than Envelope (%)	810.0%	920.0%	1010.0%	890.0%	1100.0%	810.0%	1020.0%	900.0%	1010.0%	1220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1136	1145	1152	1143	1160	1136	1153	1144	1152	987
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 160.18	$ 161.49	$ 162.47	$ 161.15	$ 163.57	$ 160.16	$ 162.59	$ 161.28	$ 162.47	$ 139.18
Annual savings in carbon tax for electricity [$/year]	$ .57	$ .57	$ .58	$ .57	$ .58	$ .57	$ .58	$ .57	$ .58	$ .49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 160.74	$ 162.06	$ 163.05	$ 161.72	$ 164.15	$ 160.73	$ 163.16	$ 161.85	$ 163.05	$ 139.67
Annual savings in GHG from electricity savings [kg CO2e/year]	12.5	12.6	12.7	12.6	12.8	12.5	12.7	12.6	12.7	10.9
Annual savings in natural gas [m3/year]	115.72	109.46	109.69	117.08	109.55	117.15	109.89	117.26	110.82	111.42
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,072.13	$ 1,014.11	$ 1,016.31	$ 1,084.77	$ 1,015.	$ 1,085.39	$ 1,018.11	$ 1,086.46	$ 1,026.71	$ 1,032.26
Annual savings in carbon tax for natural gas [$/year]	$ 267.6	$ 253.12	$ 253.67	$ 270.75	$ 253.34	$ 270.91	$ 254.12	$ 271.18	$ 256.26	$ 257.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,339.73	$ 1,267.22	$ 1,269.98	$ 1,355.52	$ 1,268.34	$ 1,356.3	$ 1,272.23	$ 1,357.64	$ 1,282.97	$ 1,289.91
Annual savings in GHG from natural gas savings [kg CO2e/year]	5946.7	5624.8	5637.1	6016.7	5629.8	6020.2	5647	6026.1	5694.7	5725.5
Net Present Value [$]	$ 16,267.72	$ 14,633.81	$ 14,543.58	$ 16,130.64	$ 14,402.59	$ 16,039.11	$ 14,371.66	$ 15,956.23	$ 14,495.94	$ 14,156.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	10.47	10.47	8.77	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 850.	$ 550.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$.

LARGE 018WWR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,321.73	$ 14,721.73	$ 16,595.73	$ 15,783.23	$ 15,871.73	$ 15,821.73	$ 15,271.73	$ 15,183.23	$ 15,221.73	$ 16,001.02
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,013.24	$ 22,112.04	$ 24,926.79	$ 23,706.41	$ 23,839.34	$ 23,764.24	$ 22,938.14	$ 22,805.21	$ 22,863.04	$ 24,033.53
Net Present Value [$]	$ 7,151.13	$ 8,747.72	$ 7,888.24	$ 7,234.86	$ 7,380.25	$ 2,285.14	$ 8,915.8	$ 8,832.37	$ 3,871.81	$ 7,364.46
Incremental dollars per GHG saving	$ 1.15	$ 1.15	$ 1.17	$ 1.18	$ 1.18	$ 1.18	$ 1.19	$ 1.19	$ 1.19	$ 1.2
Auxiliary Energy Required Heating [GJ/yr]	156.3	154.6	147.9	155	156.3	141.8	154.6	153.3	140.1	154.8
Annual Energy DHW [GJ/yr]	15.8	26.7	9.1	15.8	14.3	15.8	25	26.7	26.7	15.8
Annual Energy Space Heating [GJ/yr]	77	76.7	72.2	76.5	77	69.6	76.7	76.1	69.2	76.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	120.9	131.4	109.3	120.3	119.4	113.3	129.7	130.9	123.9	120.2
Design Heating Load [W]	25860.8	26269.9	23557.9	25637.8	25860.8	23147.8	26269.9	26046.9	23557.9	25705
Annual Energy Electricity [kWh/yr]	29184.1	29081.1	30354.8	29037.4	29185.7	27099.8	29081.1	28934.7	26993.3	29003.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,066.24	$ 4,051.66	$ 4,231.89	$ 4,045.48	$ 4,066.46	$ 3,771.31	$ 4,051.66	$ 4,030.95	$ 3,756.24	$ 4,040.62
Annual Energy Natural Gas [m3/yr]	423.9	717.8	0	423.9	385.1	423.9	672.2	717.8	717.7	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 309.63	$.	$ 182.86	$ 166.12	$ 182.86	$ 289.96	$ 309.63	$ 309.59	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	107149	107146	116872	107419	107150	116869	107147	107416	116866	108769
Upgrade Package List	Pkg1121101031	Pkg1121101031	Pkg2121101031	Pkg1121102031	Pkg1121101031	Pkg2121101031	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1131101031
GHGI [kg/m2]	2.22	3.32	0.65	2.21	2.07	2.17	3.14	3.31	3.27	2.21
% ICC	1.4%	1.3%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	85	84	80.4	84.2	85	77.1	84	83.3	76.2	84.2
Output: MEUI [kWh/(m2 * yr)]	51.7	57.4	45.4	51.4	50.9	47.6	56.5	57.1	53.3	51.3
Output: Better than ERS (%)	4770.0%	4470.0%	5290.0%	4800.0%	4840.0%	5100.0%	4540.0%	4490.0%	4790.0%	4800.0%
Output: Better than Envelope (%)	100.0%	10.0%	450.0%	10.0%	100.0%	840.0%	10.0%	100.0%	950.0%	0.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19862	19759	21033	19715	19864	17778	19759	19613	17671	19681
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,800.56	$ 2,786.03	$ 2,965.62	$ 2,779.87	$ 2,800.78	$ 2,506.67	$ 2,786.03	$ 2,765.39	$ 2,491.65	$ 2,775.04
Annual savings in carbon tax for electricity [$/year]	$ 9.93	$ 9.88	$ 10.52	$ 9.86	$ 9.93	$ 8.89	$ 9.88	$ 9.81	$ 8.84	$ 9.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,810.49	$ 2,795.91	$ 2,976.14	$ 2,789.73	$ 2,810.71	$ 2,515.56	$ 2,795.91	$ 2,775.2	$ 2,500.49	$ 2,784.88
Annual savings in GHG from electricity savings [kg CO2e/year]	218.5	217.4	231.4	216.9	218.5	195.6	217.4	215.7	194.4	216.5
Annual savings in natural gas [m3/year]	263.8	252.85	279.59	263.8	265.24	263.8	254.55	252.85	252.85	263.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,444.08	$ 2,342.62	$ 2,590.41	$ 2,444.08	$ 2,457.47	$ 2,444.08	$ 2,358.36	$ 2,342.62	$ 2,342.66	$ 2,444.08
Annual savings in carbon tax for natural gas [$/year]	$ 610.03	$ 584.71	$ 646.55	$ 610.03	$ 613.37	$ 610.03	$ 588.64	$ 584.71	$ 584.72	$ 610.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,054.11	$ 2,927.33	$ 3,236.96	$ 3,054.11	$ 3,070.85	$ 3,054.11	$ 2,947.	$ 2,927.33	$ 2,927.37	$ 3,054.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	13556.2	12993.5	14367.9	13556.2	13630.5	13556.2	13080.8	12993.5	12993.7	13556.2
Net Present Value [$]	$ 7,151.13	$ 8,747.72	$ 7,888.24	$ 7,234.86	$ 7,380.25	$ 2,285.14	$ 8,915.8	$ 8,832.37	$ 3,871.81	$ 7,364.46
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 1,374.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$.

LARGE 018WWR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 15,477.44	$ 13,351.02	$ 13,521.73	$ 13,683.23	$ 15,938.94	$ 13,812.52	$ 13,983.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,032.94	$ 19,726.11	$ 19,859.04	$ 23,247.11	$ 20,053.23	$ 20,309.64	$ 20,552.21	$ 23,940.29	$ 20,746.41	$ 21,002.81
Net Present Value [$]	$ 16,267.72	$ 16,130.64	$ 16,039.11	$ 15,997.76	$ 15,956.23	$ 15,951.91	$ 15,902.75	$ 15,860.79	$ 15,819.08	$ 15,815.55
Incremental dollars per GHG saving	$ 2.13	$ 2.18	$ 2.19	$ 2.38	$ 2.21	$ 2.22	$ 2.24	$ 2.42	$ 2.26	$ 2.27
Auxiliary Energy Required Heating [GJ/yr]	142.3	141	142.3	132	140.8	142.3	141	130.7	139.5	141
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	15.8	15.8	13.4	14.3	15.8	15.8	13.4
Annual Energy Space Heating [GJ/yr]	150.7	149.3	150.7	139.9	149.1	150.7	149.3	138.5	147.7	149.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	193.3	191.9	191.8	182.4	191.7	190.9	190.4	181	190.3	189.5
Design Heating Load [W]	23056.3	22833.3	23056.3	21864.1	22900.4	23056.3	22833.3	21641	22677.4	22833.3
Annual Energy Electricity [kWh/yr]	8186	8179.1	8186.1	8131.9	8178.2	8186.1	8179.2	8124.9	8171.2	8179.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,095.	$ 1,094.03	$ 1,095.02	$ 1,087.35	$ 1,093.9	$ 1,095.02	$ 1,094.04	$ 1,086.36	$ 1,092.91	$ 1,094.04
Annual Energy Natural Gas [m3/yr]	4398.2	4361.6	4359.8	4112.1	4356.7	4334.4	4323.1	4075.5	4320.1	4297.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,897.23	$ 1,881.44	$ 1,880.67	$ 1,773.82	$ 1,879.33	$ 1,869.71	$ 1,864.83	$ 1,758.03	$ 1,863.54	$ 1,853.88
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116860	117130	116861	123232	118480	116862	117131	123502	118750	117132
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2221101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2221102031	Pkg2131102031	Pkg2121102031
GHGI [kg/m2]	16.66	16.52	16.51	15.58	16.5	16.42	16.37	15.45	16.36	16.28
% ICC	1.1%	1.2%	1.2%	1.4%	1.2%	1.2%	1.2%	1.4%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.3	76.6	77.4	71.8	76.5	77.4	76.6	71.1	75.8	76.6
Output: MEUI [kWh/(m2 * yr)]	91.1	90.4	90.3	85.2	90.3	89.8	89.6	84.5	89.5	89.1
Output: Better than ERS (%)	1890.0%	1950.0%	1950.0%	2350.0%	1960.0%	1990.0%	2010.0%	2400.0%	2010.0%	2050.0%
Output: Better than Envelope (%)	810.0%	890.0%	810.0%	1470.0%	900.0%	810.0%	890.0%	1560.0%	990.0%	890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1136	1143	1136	1190	1144	1136	1143	1197	1151	1143
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 160.18	$ 161.15	$ 160.16	$ 167.8	$ 161.28	$ 160.16	$ 161.13	$ 168.79	$ 162.26	$ 161.13
Annual savings in carbon tax for electricity [$/year]	$ .57	$ .57	$ .57	$ .6	$ .57	$ .57	$ .57	$ .6	$ .58	$ .57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 160.74	$ 161.72	$ 160.73	$ 168.4	$ 161.85	$ 160.73	$ 161.71	$ 169.39	$ 162.84	$ 161.71
Annual savings in GHG from electricity savings [kg CO2e/year]	12.5	12.6	12.5	13.1	12.6	12.5	12.6	13.2	12.7	12.6
Annual savings in natural gas [m3/year]	115.72	117.08	117.15	126.38	117.26	118.1	118.52	127.74	118.63	119.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,072.13	$ 1,084.77	$ 1,085.39	$ 1,170.9	$ 1,086.46	$ 1,094.16	$ 1,098.06	$ 1,183.53	$ 1,099.09	$ 1,106.83
Annual savings in carbon tax for natural gas [$/year]	$ 267.6	$ 270.75	$ 270.91	$ 292.25	$ 271.18	$ 273.1	$ 274.07	$ 295.4	$ 274.33	$ 276.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,339.73	$ 1,355.52	$ 1,356.3	$ 1,463.15	$ 1,357.64	$ 1,367.25	$ 1,372.13	$ 1,478.94	$ 1,373.42	$ 1,383.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	5946.7	6016.7	6020.2	6494.5	6026.1	6068.8	6090.5	6564.5	6096.2	6139.1
Net Present Value [$]	$ 16,267.72	$ 16,130.64	$ 16,039.11	$ 15,997.76	$ 15,956.23	$ 15,951.91	$ 15,902.75	$ 15,860.79	$ 15,819.08	$ 15,815.55
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	5.28	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 8,845.78	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 8,845.78	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 850.

LARGE 018WWR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,827.44	$ 20,066.73	$ 20,288.94	$ 20,377.44	$ 20,506.73	$ 20,528.23	$ 20,616.73	$ 20,677.44	$ 20,838.94	$ 20,888.94
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,780.81	$ 30,140.23	$ 30,473.99	$ 30,606.91	$ 30,801.11	$ 30,833.4	$ 30,966.33	$ 31,057.51	$ 31,300.09	$ 31,375.19
Net Present Value [$]	$ 3,457.88	$ 3,938.38	$ 3,567.72	$ 3,626.69	$ 3,674.76	$ 4,036.41	$ 4,107.43	$ 3,674.58	$ 3,736.52	$ 1,939.07
Incremental dollars per GHG saving	$ 1.55	$ 1.57	$ 1.58	$ 1.58	$ 1.6	$ 1.6	$ 1.6	$ 1.6	$ 1.61	$ 1.56
Auxiliary Energy Required Heating [GJ/yr]	123.2	123.9	121.9	123.2	121.8	122.6	123.9	123.2	121.9	123.6
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	25.1	26.7	26.7	25	23.9	25.1	15.8
Annual Energy Space Heating [GJ/yr]	61.5	61.8	61	61.5	60.8	61.3	61.8	61.5	61	61.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	116.9	117.2	116.4	115.2	116.2	116.7	115.5	114.1	114.7	105.8
Design Heating Load [W]	21331.8	21385.7	21108.7	21331.8	21175.9	21162.6	21385.7	21331.8	21108.7	20698.7
Annual Energy Electricity [kWh/yr]	25041.8	25137.2	24904.9	25041.8	24863.5	24995.6	25137.2	25041.8	24904.9	24997.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,480.1	$ 3,493.6	$ 3,460.73	$ 3,480.1	$ 3,454.87	$ 3,473.56	$ 3,493.6	$ 3,480.1	$ 3,460.73	$ 3,473.77
Annual Energy Natural Gas [m3/yr]	718.2	717.7	718.3	672.7	717.8	717.8	672.2	642.6	672.8	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.81	$ 309.59	$ 309.85	$ 290.18	$ 309.63	$ 309.63	$ 289.96	$ 277.2	$ 290.22	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123274	126388	123544	123275	126406	126658	126389	123276	123545	123547
Upgrade Package List	Pkg2221101033	Pkg2231101032	Pkg2221102033	Pkg2221101033	Pkg2231101033	Pkg2231102032	Pkg2231101032	Pkg2221101033	Pkg2221102033	Pkg2221102033
GHGI [kg/m2]	3.23	3.23	3.23	3.06	3.22	3.23	3.06	2.95	3.06	2.13
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	67	67.4	66.3	67	66.2	66.7	67.4	67	66.3	67.2
Output: MEUI [kWh/(m2 * yr)]	49.5	49.7	49.2	48.6	49.1	49.4	48.8	48	48.3	43.5
Output: Better than ERS (%)	5080.0%	5070.0%	5100.0%	5150.0%	5110.0%	5090.0%	5140.0%	5200.0%	5170.0%	5420.0%
Output: Better than Envelope (%)	2040.0%	2000.0%	2130.0%	2040.0%	2130.0%	2080.0%	2000.0%	2040.0%	2130.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15720	15815	15583	15720	15542	15674	15815	15720	15583	15675
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,216.49	$ 2,229.94	$ 2,197.19	$ 2,216.49	$ 2,191.35	$ 2,209.98	$ 2,229.94	$ 2,216.49	$ 2,197.19	$ 2,210.19
Annual savings in carbon tax for electricity [$/year]	$ 7.86	$ 7.91	$ 7.79	$ 7.86	$ 7.77	$ 7.84	$ 7.91	$ 7.86	$ 7.79	$ 7.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,224.35	$ 2,237.85	$ 2,204.98	$ 2,224.35	$ 2,199.12	$ 2,217.81	$ 2,237.85	$ 2,224.35	$ 2,204.98	$ 2,218.03
Annual savings in GHG from electricity savings [kg CO2e/year]	172.9	174	171.4	172.9	171	172.4	174	172.9	171.4	172.4
Annual savings in natural gas [m3/year]	252.83	252.85	252.83	254.53	252.85	252.85	254.55	255.65	254.52	263.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,342.48	$ 2,342.66	$ 2,342.45	$ 2,358.19	$ 2,342.62	$ 2,342.62	$ 2,358.36	$ 2,368.58	$ 2,358.16	$ 2,444.08
Annual savings in carbon tax for natural gas [$/year]	$ 584.67	$ 584.72	$ 584.66	$ 588.59	$ 584.71	$ 584.71	$ 588.64	$ 591.19	$ 588.58	$ 610.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,927.16	$ 2,927.37	$ 2,927.11	$ 2,946.78	$ 2,927.33	$ 2,927.33	$ 2,947.	$ 2,959.77	$ 2,946.74	$ 3,054.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	12992.7	12993.7	12992.5	13079.9	12993.5	12993.5	13080.8	13137.5	13079.7	13556.2
Net Present Value [$]	$ 3,457.88	$ 3,938.38	$ 3,567.72	$ 3,626.69	$ 3,674.76	$ 4,036.41	$ 4,107.43	$ 3,674.58	$ 3,736.52	$ 1,939.07
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$ 550.	$.

LARGE 018WWR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 19,827.44	$ 20,888.94	$ 20,066.73	$ 21,106.73	$ 20,377.44	$ 20,288.94	$ 21,438.94	$ 20,677.44	$ 20,616.73	$ 20,506.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,780.81	$ 31,375.19	$ 30,140.23	$ 31,702.31	$ 30,606.91	$ 30,473.99	$ 32,201.29	$ 31,057.51	$ 30,966.33	$ 30,801.11
Net Present Value [$]	$ 3,457.88	$ 1,939.07	$ 3,938.38	$ 2,064.47	$ 3,626.69	$ 3,567.72	$ 2,168.18	$ 3,674.58	$ 4,107.43	$ 3,674.76
Incremental dollars per GHG saving	$ 1.55	$ 1.56	$ 1.57	$ 1.58	$ 1.58	$ 1.58	$ 1.59	$ 1.6	$ 1.6	$ 1.6
Auxiliary Energy Required Heating [GJ/yr]	123.2	123.6	123.9	123.4	123.2	121.9	123.6	123.2	123.9	121.8
Annual Energy DHW [GJ/yr]	26.7	15.8	26.7	15.8	25.1	26.7	14.3	23.9	25	26.7
Annual Energy Space Heating [GJ/yr]	61.5	61.3	61.8	61.2	61.5	61	61.3	61.5	61.8	60.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	116.9	105.8	117.2	105.6	115.2	116.4	104.3	114.1	115.5	116.2
Design Heating Load [W]	21331.8	20698.7	21385.7	20765.8	21331.8	21108.7	20698.7	21331.8	21385.7	21175.9
Annual Energy Electricity [kWh/yr]	25041.8	24997.1	25137.2	24961.2	25041.8	24904.9	24998.7	25041.8	25137.2	24863.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,480.1	$ 3,473.77	$ 3,493.6	$ 3,468.69	$ 3,480.1	$ 3,460.73	$ 3,474.	$ 3,480.1	$ 3,493.6	$ 3,454.87
Annual Energy Natural Gas [m3/yr]	718.2	423.9	717.7	423.9	672.7	718.3	385.1	642.6	672.2	717.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.81	$ 182.86	$ 309.59	$ 182.86	$ 290.18	$ 309.85	$ 166.12	$ 277.2	$ 289.96	$ 309.63
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	123274	123547	126388	126409	123275	123544	123548	123276	126389	126406
Upgrade Package List	Pkg2221101033	Pkg2221102033	Pkg2231101032	Pkg2231101033	Pkg2221101033	Pkg2221102033	Pkg2221102033	Pkg2221101033	Pkg2231101032	Pkg2231101033
GHGI [kg/m2]	3.23	2.13	3.23	2.13	3.06	3.23	1.98	2.95	3.06	3.22
% ICC	1.8%	1.9%	1.8%	1.9%	1.8%	1.8%	1.9%	1.8%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	67	67.2	67.4	67.1	67	66.3	67.2	67	67.4	66.2
Output: MEUI [kWh/(m2 * yr)]	49.5	43.5	49.7	43.4	48.6	49.2	42.7	48	48.8	49.1
Output: Better than ERS (%)	5080.0%	5420.0%	5070.0%	5430.0%	5150.0%	5100.0%	5490.0%	5200.0%	5140.0%	5110.0%
Output: Better than Envelope (%)	2040.0%	2020.0%	2000.0%	2030.0%	2040.0%	2130.0%	2020.0%	2040.0%	2000.0%	2130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15720	15675	15815	15639	15720	15583	15677	15720	15815	15542
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,216.49	$ 2,210.19	$ 2,229.94	$ 2,205.13	$ 2,216.49	$ 2,197.19	$ 2,210.41	$ 2,216.49	$ 2,229.94	$ 2,191.35
Annual savings in carbon tax for electricity [$/year]	$ 7.86	$ 7.84	$ 7.91	$ 7.82	$ 7.86	$ 7.79	$ 7.84	$ 7.86	$ 7.91	$ 7.77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,224.35	$ 2,218.03	$ 2,237.85	$ 2,212.95	$ 2,224.35	$ 2,204.98	$ 2,218.25	$ 2,224.35	$ 2,237.85	$ 2,199.12
Annual savings in GHG from electricity savings [kg CO2e/year]	172.9	172.4	174	172	172.9	171.4	172.4	172.9	174	171
Annual savings in natural gas [m3/year]	252.83	263.8	252.85	263.8	254.53	252.83	265.24	255.65	254.55	252.85
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,342.48	$ 2,444.08	$ 2,342.66	$ 2,444.08	$ 2,358.19	$ 2,342.45	$ 2,457.47	$ 2,368.58	$ 2,358.36	$ 2,342.62
Annual savings in carbon tax for natural gas [$/year]	$ 584.67	$ 610.03	$ 584.72	$ 610.03	$ 588.59	$ 584.66	$ 613.37	$ 591.19	$ 588.64	$ 584.71
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,927.16	$ 3,054.11	$ 2,927.37	$ 3,054.11	$ 2,946.78	$ 2,927.11	$ 3,070.85	$ 2,959.77	$ 2,947.	$ 2,927.33
Annual savings in GHG from natural gas savings [kg CO2e/year]	12992.7	13556.2	12993.7	13556.2	13079.9	12992.5	13630.5	13137.5	13080.8	12993.5
Net Present Value [$]	$ 3,457.88	$ 1,939.07	$ 3,938.38	$ 2,064.47	$ 3,626.69	$ 3,567.72	$ 2,168.18	$ 3,674.58	$ 4,107.43	$ 3,674.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$ 600.	$.	$ 600.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$.

LARGE 018WWR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 25,245.17	$ 25,745.17	$ 25,795.17	$ 26,095.17	$ 25,924.46	$ 26,295.17	$ 26,595.17	$ 26,424.46	$ 26,474.46	$ 26,774.46
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,918.25	$ 38,669.25	$ 38,744.35	$ 39,194.95	$ 38,938.54	$ 39,495.35	$ 39,945.95	$ 39,689.54	$ 39,764.64	$ 40,215.24
Net Present Value [$]	$ 12,554.95	$ 12,359.04	$ 12,326.51	$ 12,239.67	$ 12,234.41	$ 12,131.15	$ 12,043.77	$ 12,036.8	$ 12,006.89	$ 11,919.51
Incremental dollars per GHG saving	$ 3.17	$ 3.2	$ 3.21	$ 3.22	$ 3.22	$ 3.24	$ 3.26	$ 3.26	$ 3.26	$ 3.28
Auxiliary Energy Required Heating [GJ/yr]	104.6	103.4	104.6	104.6	103.1	103.4	103.4	101.9	103.2	103.2
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	13.4	15.8	14.3	13.4	15.8	14.3	13.4
Annual Energy Space Heating [GJ/yr]	110.8	109.5	110.8	110.8	109.3	109.5	109.5	108	109.3	109.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	154	152.7	152.6	151.6	152.5	151.3	150.3	151.2	151	150.1
Design Heating Load [W]	17377.7	17332.7	17377.7	17377.7	17221.8	17332.7	17332.7	17176.9	17221.8	17221.8
Annual Energy Electricity [kWh/yr]	8169.3	8162.8	8169.4	8169.5	8161.7	8162.9	8163	8155.2	8161.7	8161.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,092.64	$ 1,091.72	$ 1,092.66	$ 1,092.67	$ 1,091.57	$ 1,091.74	$ 1,091.75	$ 1,090.65	$ 1,091.57	$ 1,091.58
Annual Energy Natural Gas [m3/yr]	3345.5	3311.2	3307.1	3281.6	3305	3272.7	3247.3	3270.9	3266.5	3241.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,443.13	$ 1,428.34	$ 1,426.57	$ 1,415.57	$ 1,425.66	$ 1,411.73	$ 1,400.77	$ 1,410.95	$ 1,409.05	$ 1,398.1
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	156388	156406	156389	156390	156964	156407	156408	156982	156965	156966
Upgrade Package List	Pkg4321302033	Pkg4321302034	Pkg4321302033	Pkg4321302033	Pkg4331302033	Pkg4321302034	Pkg4321302034	Pkg4331302034	Pkg4331302033	Pkg4331302033
GHGI [kg/m2]	12.71	12.58	12.57	12.47	12.56	12.44	12.34	12.43	12.42	12.32
% ICC	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%	2.3%	2.3%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.9	56.2	56.9	56.9	56.1	56.2	56.2	55.4	56.1	56.1
Output: MEUI [kWh/(m2 * yr)]	69.8	69.1	69	68.5	68.9	68.3	67.8	68.2	68.2	67.7
Output: Better than ERS (%)	3540.0%	3590.0%	3600.0%	3640.0%	3600.0%	3650.0%	3690.0%	3660.0%	3660.0%	3700.0%
Output: Better than Envelope (%)	3240.0%	3320.0%	3240.0%	3240.0%	3340.0%	3320.0%	3320.0%	3420.0%	3330.0%	3330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1153	1159	1153	1152	1160	1159	1159	1167	1160	1160
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 162.53	$ 163.45	$ 162.52	$ 162.5	$ 163.6	$ 163.43	$ 163.42	$ 164.52	$ 163.6	$ 163.59
Annual savings in carbon tax for electricity [$/year]	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 163.11	$ 164.03	$ 163.09	$ 163.08	$ 164.18	$ 164.01	$ 164.	$ 165.1	$ 164.18	$ 164.17
Annual savings in GHG from electricity savings [kg CO2e/year]	12.7	12.8	12.7	12.7	12.8	12.8	12.7	12.8	12.8	12.8
Annual savings in natural gas [m3/year]	154.94	156.22	156.37	157.32	156.45	157.65	158.6	157.72	157.88	158.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,435.53	$ 1,447.37	$ 1,448.79	$ 1,457.59	$ 1,449.51	$ 1,460.66	$ 1,469.43	$ 1,461.28	$ 1,462.8	$ 1,471.57
Annual savings in carbon tax for natural gas [$/year]	$ 358.3	$ 361.26	$ 361.61	$ 363.81	$ 361.79	$ 364.57	$ 366.76	$ 364.73	$ 365.11	$ 367.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,793.83	$ 1,808.63	$ 1,810.4	$ 1,821.4	$ 1,811.3	$ 1,825.24	$ 1,836.19	$ 1,826.01	$ 1,827.91	$ 1,838.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	7962.3	8027.9	8035.8	8084.6	8039.8	8101.6	8150.3	8105.1	8113.5	8162.2
Net Present Value [$]	$ 12,554.95	$ 12,359.04	$ 12,326.51	$ 12,239.67	$ 12,234.41	$ 12,131.15	$ 12,043.77	$ 12,036.8	$ 12,006.89	$ 11,919.51
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.

LARGE 018WWR Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 43,633.48	$ 44,133.48	$ 44,183.48	$ 44,272.48	$ 44,312.77	$ 44,483.48	$ 44,683.48	$ 44,733.48	$ 44,772.48	$ 44,812.77
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 65,537.49	$ 66,288.49	$ 66,363.59	$ 66,497.26	$ 66,557.78	$ 66,814.19	$ 67,114.59	$ 67,189.69	$ 67,248.26	$ 67,308.78
Net Present Value [$]	$ 13,980.06	$ 14,165.52	$ 14,149.1	$ 14,619.06	$ 14,217.02	$ 14,196.99	$ 14,334.32	$ 12,524.65	$ 14,804.52	$ 14,403.57
Incremental dollars per GHG saving	$ 3.39	$ 3.43	$ 3.41	$ 3.44	$ 3.44	$ 3.42	$ 3.45	$ 3.33	$ 3.48	$ 3.48
Auxiliary Energy Required Heating [GJ/yr]	84.6	83.4	84.6	84.6	83.2	84.6	83.4	85	83.4	82
Annual Energy DHW [GJ/yr]	26.8	26.8	25.1	26.8	26.8	24	25.1	15.8	26.8	26.8
Annual Energy Space Heating [GJ/yr]	42.9	42.5	42.9	42.9	42.3	42.9	42.5	42.8	42.5	41.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	98.3	97.9	96.6	98.3	97.7	95.5	96.2	87.2	97.9	97.3
Design Heating Load [W]	15770.7	15725.8	15770.7	15770.7	15614.8	15770.7	15725.8	15332.6	15725.8	15569.9
Annual Energy Electricity [kWh/yr]	19880	19757.2	19880	19880	19709.5	19880	19757.2	19846.9	19757.2	19587.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,749.7	$ 2,732.33	$ 2,749.7	$ 2,749.7	$ 2,725.58	$ 2,749.7	$ 2,732.33	$ 2,745.02	$ 2,732.33	$ 2,708.26
Annual Energy Natural Gas [m3/yr]	718.8	719	673.3	718.8	718.4	643.2	673.5	423.9	719	718.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 310.07	$ 310.15	$ 290.44	$ 310.07	$ 309.89	$ 277.45	$ 290.52	$ 182.86	$ 310.15	$ 309.98
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156466	156484	156467	156754	157042	156468	156485	156487	156772	157060
Upgrade Package List	Pkg4321302053	Pkg4321302054	Pkg4321302053	Pkg4321402053	Pkg4331302053	Pkg4321302053	Pkg4321302054	Pkg4321302054	Pkg4321402054	Pkg4331302054
GHGI [kg/m2]	3.12	3.12	2.95	3.12	3.12	2.84	2.95	2.02	3.12	3.11
% ICC	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46	45.3	46	46	45.2	46	45.3	46.2	45.3	44.6
Output: MEUI [kWh/(m2 * yr)]	39.4	39.2	38.5	39.4	39.1	37.9	38.3	33.4	39.2	38.8
Output: Better than ERS (%)	5860.0%	5880.0%	5940.0%	5860.0%	5890.0%	5980.0%	5950.0%	6230.0%	5880.0%	5910.0%
Output: Better than Envelope (%)	4530.0%	4610.0%	4530.0%	4530.0%	4630.0%	4530.0%	4610.0%	4510.0%	4610.0%	4700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10558	10435	10558	10558	10388	10558	10435	10525	10435	10265
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 1,488.68	$ 1,471.36	$ 1,488.68	$ 1,488.68	$ 1,464.64	$ 1,488.68	$ 1,471.36	$ 1,484.01	$ 1,471.36	$ 1,447.38
Annual savings in carbon tax for electricity [$/year]	$ 5.28	$ 5.22	$ 5.28	$ 5.28	$ 5.19	$ 5.28	$ 5.22	$ 5.26	$ 5.22	$ 5.13
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,493.96	$ 1,476.58	$ 1,493.96	$ 1,493.96	$ 1,469.83	$ 1,493.96	$ 1,476.58	$ 1,489.27	$ 1,476.58	$ 1,452.51
Annual savings in GHG from electricity savings [kg CO2e/year]	116.1	114.8	116.1	116.1	114.3	116.1	114.8	115.8	114.8	112.9
Annual savings in natural gas [m3/year]	252.81	252.8	254.5	252.81	252.82	255.63	254.5	263.8	252.8	252.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,342.28	$ 2,342.21	$ 2,357.98	$ 2,342.28	$ 2,342.42	$ 2,368.37	$ 2,357.92	$ 2,444.08	$ 2,342.21	$ 2,342.35
Annual savings in carbon tax for natural gas [$/year]	$ 584.62	$ 584.6	$ 588.54	$ 584.62	$ 584.66	$ 591.14	$ 588.52	$ 610.03	$ 584.6	$ 584.64
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,926.9	$ 2,926.81	$ 2,946.53	$ 2,926.9	$ 2,927.07	$ 2,959.51	$ 2,946.44	$ 3,054.11	$ 2,926.81	$ 2,926.99
Annual savings in GHG from natural gas savings [kg CO2e/year]	12991.6	12991.2	13078.7	12991.6	12992.4	13136.3	13078.3	13556.2	12991.2	12992
Net Present Value [$]	$ 13,980.06	$ 14,165.52	$ 14,149.1	$ 14,619.06	$ 14,217.02	$ 14,196.99	$ 14,334.32	$ 12,524.65	$ 14,804.52	$ 14,403.57
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$.

LARGE 018WWR Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 44,733.48	$ 44,912.77	$ 45,283.48	$ 45,583.48	$ 45,462.77	$ 45,762.77	$ 45,372.48	$ 45,412.77	$ 45,551.77	$ 43,633.48
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 67,189.69	$ 67,458.98	$ 68,015.79	$ 68,466.39	$ 68,285.08	$ 68,735.68	$ 68,149.46	$ 68,209.98	$ 68,418.76	$ 65,537.49
Net Present Value [$]	$ 12,524.65	$ 12,585.26	$ 12,753.58	$ 12,840.73	$ 12,814.19	$ 12,901.34	$ 13,163.65	$ 12,768.11	$ 13,224.26	$ 13,980.06
Incremental dollars per GHG saving	$ 3.33	$ 3.34	$ 3.35	$ 3.36	$ 3.36	$ 3.37	$ 3.38	$ 3.38	$ 3.39	$ 3.39
Auxiliary Energy Required Heating [GJ/yr]	85	84.9	85.1	85.1	84.9	84.9	85	83.7	84.9	84.6
Annual Energy DHW [GJ/yr]	15.8	15.8	14.3	13.4	14.3	13.4	15.8	15.8	15.8	26.8
Annual Energy Space Heating [GJ/yr]	42.8	42.6	42.8	42.8	42.7	42.7	42.8	42.2	42.6	42.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	87.2	87.1	85.8	84.8	85.6	84.7	87.2	86.6	87.1	98.3
Design Heating Load [W]	15332.6	15221.6	15332.6	15332.6	15221.6	15221.6	15332.6	15176.7	15221.6	15770.7
Annual Energy Electricity [kWh/yr]	19846.9	19800.8	19848.4	19849.3	19802.3	19803.2	19846.9	19677.6	19800.8	19880
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,745.02	$ 2,738.5	$ 2,745.23	$ 2,745.36	$ 2,738.71	$ 2,738.84	$ 2,745.02	$ 2,721.07	$ 2,738.5	$ 2,749.7
Annual Energy Natural Gas [m3/yr]	423.9	423.9	385.1	359.4	385.1	359.4	423.9	423.9	423.9	718.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 166.12	$ 155.03	$ 166.12	$ 155.03	$ 182.86	$ 182.86	$ 182.86	$ 310.07
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	156487	157045	156488	156489	157046	157047	156775	157063	157333	156466
Upgrade Package List	Pkg4321302054	Pkg4331302053	Pkg4321302054	Pkg4321302054	Pkg4331302053	Pkg4331302053	Pkg4321402054	Pkg4331302054	Pkg4331402053	Pkg4321302053
GHGI [kg/m2]	2.02	2.01	1.87	1.77	1.87	1.77	2.02	2.01	2.01	3.12
% ICC	4.0%	4.0%	4.0%	4.0%	4.0%	4.1%	4.0%	4.0%	4.0%	3.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.2	46.1	46.2	46.2	46.1	46.1	46.2	45.5	46.1	46
Output: MEUI [kWh/(m2 * yr)]	33.4	33.3	32.6	32.1	32.5	32	33.4	33.1	33.3	39.4
Output: Better than ERS (%)	6230.0%	6230.0%	6290.0%	6330.0%	6300.0%	6340.0%	6230.0%	6250.0%	6230.0%	5860.0%
Output: Better than Envelope (%)	4510.0%	4520.0%	4500.0%	4500.0%	4520.0%	4520.0%	4510.0%	4590.0%	4520.0%	4530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10525	10479	10526	10527	10480	10481	10525	10356	10479	10558
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,484.01	$ 1,477.51	$ 1,484.22	$ 1,484.35	$ 1,477.72	$ 1,477.85	$ 1,484.01	$ 1,460.14	$ 1,477.51	$ 1,488.68
Annual savings in carbon tax for electricity [$/year]	$ 5.26	$ 5.24	$ 5.26	$ 5.26	$ 5.24	$ 5.24	$ 5.26	$ 5.18	$ 5.24	$ 5.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,489.27	$ 1,482.75	$ 1,489.49	$ 1,489.61	$ 1,482.96	$ 1,483.09	$ 1,489.27	$ 1,465.32	$ 1,482.75	$ 1,493.96
Annual savings in GHG from electricity savings [kg CO2e/year]	115.8	115.3	115.8	115.8	115.3	115.3	115.8	113.9	115.3	116.1
Annual savings in natural gas [m3/year]	263.8	263.8	265.24	266.2	265.24	266.2	263.8	263.8	263.8	252.81
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,444.08	$ 2,444.08	$ 2,457.47	$ 2,466.34	$ 2,457.47	$ 2,466.34	$ 2,444.08	$ 2,444.08	$ 2,444.08	$ 2,342.28
Annual savings in carbon tax for natural gas [$/year]	$ 610.03	$ 610.03	$ 613.37	$ 615.59	$ 613.37	$ 615.59	$ 610.03	$ 610.03	$ 610.03	$ 584.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,054.11	$ 3,054.11	$ 3,070.85	$ 3,081.93	$ 3,070.85	$ 3,081.93	$ 3,054.11	$ 3,054.11	$ 3,054.11	$ 2,926.9
Annual savings in GHG from natural gas savings [kg CO2e/year]	13556.2	13556.2	13630.5	13679.7	13630.5	13679.7	13556.2	13556.2	13556.2	12991.6
Net Present Value [$]	$ 12,524.65	$ 12,585.26	$ 12,753.58	$ 12,840.73	$ 12,814.19	$ 12,901.34	$ 13,163.65	$ 12,768.11	$ 13,224.26	$ 13,980.06
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51	$ 19,486.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$.

LARGE 018WWR Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 54,029.47	$ 54,329.47	$ 54,599.58	$ 54,668.47	$ 54,968.47	$ 55,130.83	$ 55,238.58	$ 55,430.83	$ 55,630.83	$ 55,930.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 81,152.26	$ 81,602.86	$ 82,008.57	$ 82,112.04	$ 82,562.64	$ 82,806.51	$ 82,968.35	$ 83,257.11	$ 83,557.51	$ 84,008.11
Net Present Value [$]	$ 9,825.68	$ 9,912.33	$ 10,379.32	$ 10,464.68	$ 10,551.33	$ 10,990.93	$ 11,018.32	$ 11,078.49	$ 11,185.32	$ 11,272.52
Incremental dollars per GHG saving	$ 5.77	$ 5.77	$ 5.83	$ 5.84	$ 5.84	$ 5.9	$ 5.9	$ 5.9	$ 5.91	$ 5.91
Auxiliary Energy Required Heating [GJ/yr]	80	80.1	80.8	80	80.1	80.3	80.8	80.3	79.1	79.1
Annual Energy DHW [GJ/yr]	14.3	13.4	13.4	14.3	13.4	14.3	13.4	13.4	14.3	13.4
Annual Energy Space Heating [GJ/yr]	84.8	84.8	85.6	84.8	84.8	85.1	85.6	85.1	83.7	83.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	126.5	125.6	126.4	126.5	125.6	126.8	126.4	125.9	125.5	124.6
Design Heating Load [W]	13930	13930	13952.8	13930	13930	13866.8	13952.8	13866.8	13821.8	13821.8
Annual Energy Electricity [kWh/yr]	8039.5	8039.6	8043.8	8039.5	8039.6	8040.9	8043.8	8041	8034.4	8034.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,074.27	$ 1,074.29	$ 1,074.88	$ 1,074.27	$ 1,074.29	$ 1,074.47	$ 1,074.88	$ 1,074.49	$ 1,073.55	$ 1,073.55
Annual Energy Natural Gas [m3/yr]	2620.9	2595.4	2617.6	2620.9	2595.4	2628.1	2617.6	2602.7	2593.6	2568.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,130.56	$ 1,119.57	$ 1,129.14	$ 1,130.56	$ 1,119.57	$ 1,133.67	$ 1,129.14	$ 1,122.71	$ 1,118.79	$ 1,107.83
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	157235	157236	157668	157523	157524	157793	157956	157794	157811	157812
Upgrade Package List	Pkg4331303064	Pkg4331303064	Pkg4341302064	Pkg4331403064	Pkg4331403064	Pkg4341303063	Pkg4341402064	Pkg4341303063	Pkg4341303064	Pkg4341303064
GHGI [kg/m2]	9.99	9.9	9.98	9.99	9.9	10.02	9.98	9.93	9.89	9.8
% ICC	4.8%	4.8%	4.8%	4.8%	4.9%	4.9%	4.9%	4.9%	4.9%	5.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	43.5	43.5	43.9	43.5	43.5	43.7	43.9	43.7	43	43
Output: MEUI [kWh/(m2 * yr)]	54.9	54.3	54.8	54.9	54.3	55	54.8	54.5	54.3	53.8
Output: Better than ERS (%)	4690.0%	4730.0%	4700.0%	4690.0%	4730.0%	4680.0%	4700.0%	4720.0%	4730.0%	4770.0%
Output: Better than Envelope (%)	4830.0%	4830.0%	4780.0%	4830.0%	4830.0%	4810.0%	4780.0%	4810.0%	4890.0%	4890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1282	1282	1278	1282	1282	1281	1278	1281	1288	1288
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 180.83	$ 180.82	$ 180.23	$ 180.83	$ 180.82	$ 180.64	$ 180.23	$ 180.62	$ 181.55	$ 181.55
Annual savings in carbon tax for electricity [$/year]	$ .64	$ .64	$ .64	$ .64	$ .64	$ .64	$ .64	$ .64	$ .64	$ .64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 181.47	$ 181.46	$ 180.87	$ 181.47	$ 181.46	$ 181.28	$ 180.87	$ 181.26	$ 182.2	$ 182.2
Annual savings in GHG from electricity savings [kg CO2e/year]	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.2	14.2
Annual savings in natural gas [m3/year]	181.94	182.89	182.06	181.94	182.89	181.67	182.06	182.62	182.96	183.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,685.67	$ 1,694.47	$ 1,686.8	$ 1,685.67	$ 1,694.47	$ 1,683.18	$ 1,686.8	$ 1,691.95	$ 1,695.09	$ 1,703.86
Annual savings in carbon tax for natural gas [$/year]	$ 420.73	$ 422.93	$ 421.02	$ 420.73	$ 422.93	$ 420.11	$ 421.02	$ 422.3	$ 423.09	$ 425.27
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,106.4	$ 2,117.4	$ 2,107.82	$ 2,106.4	$ 2,117.4	$ 2,103.29	$ 2,107.82	$ 2,114.25	$ 2,118.18	$ 2,129.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	9349.6	9398.5	9356	9349.6	9398.5	9335.9	9356	9384.5	9401.9	9450.5
Net Present Value [$]	$ 9,825.68	$ 9,912.33	$ 10,379.32	$ 10,464.68	$ 10,551.33	$ 10,990.93	$ 11,018.32	$ 11,078.49	$ 11,185.32	$ 11,272.52
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.47	14.09	14.09	14.09	10.47	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.

LARGE 018WWR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R-22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,671.73	$ 13,133.23	$ 13,221.73	$ 13,351.02	$ 13,521.73	$ 13,683.23	$ 13,812.52	$ 13,871.73	$ 13,901.02	$ 13,983.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 19,032.94	$ 19,726.11	$ 19,859.04	$ 20,053.23	$ 20,309.64	$ 20,552.21	$ 20,746.41	$ 20,835.34	$ 20,879.33	$ 21,002.81
Net Present Value [$]	$ 20,549.57	$ 20,484.2	$ 20,334.48	$ 20,299.3	$ 20,257.05	$ 20,269.3	$ 20,233.14	$ 18,657.05	$ 20,084.39	$ 20,191.68
Incremental dollars per GHG saving	$ 1.84	$ 1.89	$ 1.9	$ 1.92	$ 1.93	$ 1.94	$ 1.96	$ 2.04	$ 1.97	$ 1.97
Auxiliary Energy Required Heating [GJ/yr]	181.2	179.6	181.2	179.4	181.2	179.6	177.8	172.1	179.4	179.6
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	16.2	13.7	14.7	16.2	27.1	14.7	13.7
Annual Energy Space Heating [GJ/yr]	191.9	190.2	191.9	190.1	191.9	190.2	188.4	182.3	190.1	190.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.8	1.2	1.2
Total Energy [GJ/yr]	234.8	233.1	233.3	233	232.4	231.6	231.3	236.9	231.5	230.7
Design Heating Load [W]	24914.7	24676	24914.7	24744	24914.7	24676	24505.3	24260.2	24744	24676
Annual Energy Electricity [kWh/yr]	8396.3	8387.9	8396.4	8387.2	8396.5	8387.9	8378.7	8526.4	8387.2	8388
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,124.76	$ 1,123.57	$ 1,124.78	$ 1,123.47	$ 1,124.79	$ 1,123.57	$ 1,122.27	$ 1,143.17	$ 1,123.47	$ 1,123.59
Annual Energy Natural Gas [m3/yr]	5494.3	5449.6	5454.3	5445.9	5427.7	5409.6	5401.3	5537	5405.9	5383
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,370.05	$ 2,350.77	$ 2,352.79	$ 2,349.17	$ 2,341.32	$ 2,333.51	$ 2,329.93	$ 2,388.47	$ 2,331.92	$ 2,322.04
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11452	11722	11453	13072	11454	11723	13342	11485	13073	11724
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2131102031	Pkg2121101033	Pkg2131101031	Pkg2121102031
GHGI [kg/m2]	20.77	20.6	20.62	20.59	20.52	20.45	20.42	20.93	20.44	20.35
% ICC	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	98.5	97.6	98.5	97.5	98.5	97.6	96.7	93.6	97.5	97.6
Output: MEUI [kWh/(m2 * yr)]	113.7	112.8	112.9	112.7	112.4	112	111.8	114.8	111.9	111.5
Output: Better than ERS (%)	1850.0%	1910.0%	1900.0%	1920.0%	1940.0%	1960.0%	1970.0%	1970.0%	1970.0%	2000.0%
Output: Better than Envelope (%)	360.0%	270.0%	360.0%	260.0%	360.0%	270.0%	170.0%	160.0%	260.0%	270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1236	1245	1236	1245	1236	1245	1254	1106	1245	1244
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 174.3	$ 175.49	$ 174.29	$ 175.59	$ 174.28	$ 175.49	$ 176.79	$ 155.96	$ 175.59	$ 175.47
Annual savings in carbon tax for electricity [$/year]	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62	$ .63	$ .55	$ .62	$ .62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 174.92	$ 176.11	$ 174.91	$ 176.21	$ 174.89	$ 176.11	$ 177.41	$ 156.51	$ 176.21	$ 176.1
Annual savings in GHG from electricity savings [kg CO2e/year]	13.6	13.7	13.6	13.7	13.6	13.7	13.8	12.2	13.7	13.7
Annual savings in natural gas [m3/year]	133.62	135.28	135.11	135.42	136.1	136.77	137.08	132.03	136.91	137.76
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,237.97	$ 1,253.4	$ 1,251.78	$ 1,254.68	$ 1,260.96	$ 1,267.21	$ 1,270.07	$ 1,223.23	$ 1,268.49	$ 1,276.39
Annual savings in carbon tax for natural gas [$/year]	$ 308.99	$ 312.84	$ 312.44	$ 313.16	$ 314.73	$ 316.29	$ 317.	$ 305.31	$ 316.61	$ 318.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,546.96	$ 1,566.24	$ 1,564.22	$ 1,567.84	$ 1,575.69	$ 1,583.5	$ 1,587.08	$ 1,528.54	$ 1,585.09	$ 1,594.97
Annual savings in GHG from natural gas savings [kg CO2e/year]	6866.5	6952.1	6943.1	6959.1	6994	7028.7	7044.5	6784.7	7035.7	7079.6
Net Present Value [$]	$ 20,549.57	$ 20,484.2	$ 20,334.48	$ 20,299.3	$ 20,257.05	$ 20,269.3	$ 20,233.14	$ 18,657.05	$ 20,084.39	$ 20,191.68
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff	BC R-22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 550.	$ 850.

LARGE 018WWR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40_SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,221.73	$ 15,821.73	$ 15,683.23	$ 15,771.73	$ 16,283.23	$ 16,371.73	$ 15,901.02	$ 16,501.02	$ 16,071.73	$ 16,671.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,863.04	$ 23,764.24	$ 23,556.21	$ 23,689.14	$ 24,457.41	$ 24,590.34	$ 23,883.33	$ 24,784.53	$ 24,139.74	$ 25,040.94
Net Present Value [$]	$ 11,995.06	$ 10,236.55	$ 11,906.06	$ 12,148.09	$ 10,124.74	$ 10,452.99	$ 12,042.49	$ 10,282.82	$ 12,184.09	$ 10,530.92
Incremental dollars per GHG saving	$ .97	$ .97	$ 1.	$ 1.	$ 1.	$ 1.	$ 1.01	$ 1.01	$ 1.01	$ 1.02
Auxiliary Energy Required Heating [GJ/yr]	179.4	180.7	177.8	179.4	179.1	180.7	177.7	178.9	179.4	180.7
Annual Energy DHW [GJ/yr]	27.2	16.2	27.2	25.4	16.2	14.7	27.1	16.2	24.2	13.7
Annual Energy Space Heating [GJ/yr]	98.9	99.1	98.2	98.9	98.3	99.1	98.1	98.2	98.9	99.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	155.1	144.3	154.4	153.4	143.5	142.8	154.3	143.4	152.2	141.8
Design Heating Load [W]	25465.9	25013.1	25227.2	25465.9	24774.4	25013.1	25295.1	24842.4	25465.9	25013.1
Annual Energy Electricity [kWh/yr]	35550.3	35595	35336.2	35550.3	35372.3	35596.9	35306.2	35349.1	35550.3	35598.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,967.05	$ 4,973.38	$ 4,936.76	$ 4,967.05	$ 4,941.87	$ 4,973.65	$ 4,932.51	$ 4,938.58	$ 4,967.05	$ 4,973.82
Annual Energy Natural Gas [m3/yr]	729.4	434.1	729.5	682	434.1	393.7	729	434.1	650.5	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.64	$ 187.26	$ 314.68	$ 294.19	$ 187.26	$ 169.83	$ 314.47	$ 187.26	$ 280.6	$ 158.22
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11458	11461	11728	11459	11731	11462	13078	13081	11460	11463
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2122102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2131101031	Pkg2121101031	Pkg2121101031
GHGI [kg/m2]	3.5	2.39	3.49	3.32	2.39	2.24	3.49	2.39	3.2	2.14
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.4%	1.5%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	97.5	98.2	96.6	97.5	97.3	98.2	96.6	97.3	97.5	98.2
Output: MEUI [kWh/(m2 * yr)]	70.2	64.3	69.8	69.2	63.9	63.5	69.7	63.8	68.6	62.9
Output: Better than ERS (%)	4580.0%	4830.0%	4600.0%	4640.0%	4860.0%	4880.0%	4610.0%	4860.0%	4680.0%	4920.0%
Output: Better than Envelope (%)	260.0%	330.0%	170.0%	260.0%	240.0%	330.0%	160.0%	230.0%	260.0%	330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25918	25962	25704	25918	25740	25964	25674	25717	25918	25966
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,654.41	$ 3,660.71	$ 3,624.22	$ 3,654.41	$ 3,629.31	$ 3,660.98	$ 3,619.99	$ 3,626.04	$ 3,654.41	$ 3,661.15
Annual savings in carbon tax for electricity [$/year]	$ 12.96	$ 12.98	$ 12.85	$ 12.96	$ 12.87	$ 12.98	$ 12.84	$ 12.86	$ 12.96	$ 12.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,667.37	$ 3,673.69	$ 3,637.07	$ 3,667.37	$ 3,642.18	$ 3,673.96	$ 3,632.83	$ 3,638.9	$ 3,667.37	$ 3,674.13
Annual savings in GHG from electricity savings [kg CO2e/year]	285.1	285.6	282.7	285.1	283.1	285.6	282.4	282.9	285.1	285.6
Annual savings in natural gas [m3/year]	311.15	322.16	311.15	312.92	322.16	323.66	311.17	322.16	314.09	324.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,882.83	$ 2,984.77	$ 2,882.8	$ 2,899.19	$ 2,984.77	$ 2,998.72	$ 2,882.97	$ 2,984.77	$ 2,910.07	$ 3,008.
Annual savings in carbon tax for natural gas [$/year]	$ 719.54	$ 744.98	$ 719.53	$ 723.63	$ 744.98	$ 748.47	$ 719.58	$ 744.98	$ 726.34	$ 750.78
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,602.37	$ 3,729.76	$ 3,602.33	$ 3,622.82	$ 3,729.76	$ 3,747.18	$ 3,602.55	$ 3,729.76	$ 3,636.41	$ 3,758.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	15989.8	16555.2	15989.6	16080.6	16555.2	16632.6	15990.6	16555.2	16140.9	16684.1
Net Present Value [$]	$ 11,995.06	$ 10,236.55	$ 11,906.06	$ 12,148.09	$ 10,124.74	$ 10,452.99	$ 12,042.49	$ 10,282.82	$ 12,184.09	$ 10,530.92
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35	USI1.40_SHGC0.35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$ 850.	$ 850.

LARGE 018WWR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,477.44	$ 15,938.94	$ 16,027.44	$ 12,671.73	$ 16,156.73	$ 16,488.94	$ 16,327.44	$ 13,133.23	$ 16,618.23	$ 17,277.44
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,247.11	$ 23,940.29	$ 24,073.21	$ 19,032.94	$ 24,267.41	$ 24,766.39	$ 24,523.81	$ 19,726.11	$ 24,960.58	$ 25,950.71
Net Present Value [$]	$ 20,779.55	$ 20,711.75	$ 20,564.46	$ 20,549.57	$ 20,527.39	$ 20,497.21	$ 20,487.21	$ 20,484.2	$ 20,460.33	$ 20,427.53
Incremental dollars per GHG saving	$ 2.05	$ 2.09	$ 2.11	$ 1.84	$ 2.12	$ 2.14	$ 2.13	$ 1.89	$ 2.15	$ 2.17
Auxiliary Energy Required Heating [GJ/yr]	168.9	167.3	168.9	181.2	167.2	167.3	168.9	179.6	165.6	161.2
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	16.2	16.2	14.7	13.7	16.2	16.2	16.2
Annual Energy Space Heating [GJ/yr]	178.9	177.2	178.9	191.9	177.1	177.2	178.9	190.2	175.4	170.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.8
Total Energy [GJ/yr]	221.8	220.2	220.4	234.8	220	218.7	219.4	233.1	218.3	214.3
Design Heating Load [W]	23638.8	23400.1	23638.8	24914.7	23468.1	23400.1	23638.8	24676	23229.4	22532.4
Annual Energy Electricity [kWh/yr]	8331.5	8323.1	8331.6	8396.3	8322.4	8323.2	8331.6	8387.9	8314	8468.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,115.59	$ 1,114.4	$ 1,115.61	$ 1,124.76	$ 1,114.3	$ 1,114.42	$ 1,115.61	$ 1,123.57	$ 1,113.12	$ 1,134.99
Annual Energy Natural Gas [m3/yr]	5151.8	5107.4	5111.8	5494.3	5103.6	5067.3	5085.2	5449.6	5059.1	4936.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,222.31	$ 2,203.15	$ 2,205.05	$ 2,370.05	$ 2,201.52	$ 2,185.86	$ 2,193.58	$ 2,350.77	$ 2,182.32	$ 2,129.56
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17824	18094	17825	11452	20956	18095	17826	11722	21226	17860
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2121101031	Pkg2231101031	Pkg2221102031	Pkg2221101031	Pkg2121102031	Pkg2231102031	Pkg2221101033
GHGI [kg/m2]	19.48	19.32	19.33	20.77	19.3	19.17	19.23	20.6	19.14	18.68
% ICC	1.4%	1.4%	1.4%	1.1%	1.4%	1.5%	1.4%	1.2%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	91.8	90.9	91.8	98.5	90.9	91	91.8	97.6	90	87.6
Output: MEUI [kWh/(m2 * yr)]	106.7	105.8	105.9	113.7	105.7	104.9	105.3	112.8	104.8	102.6
Output: Better than ERS (%)	2300.0%	2360.0%	2350.0%	1850.0%	2370.0%	2410.0%	2390.0%	1910.0%	2430.0%	2560.0%
Output: Better than Envelope (%)	340.0%	430.0%	340.0%	360.0%	440.0%	430.0%	340.0%	270.0%	530.0%	780.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1301	1309	1301	1236	1310	1309	1301	1245	1318	1164
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 183.44	$ 184.63	$ 183.43	$ 174.3	$ 184.72	$ 184.61	$ 183.43	$ 175.49	$ 185.91	$ 164.11
Annual savings in carbon tax for electricity [$/year]	$ .65	$ .65	$ .65	$ .62	$ .66	$ .65	$ .65	$ .62	$ .66	$ .58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 184.09	$ 185.28	$ 184.08	$ 174.92	$ 185.38	$ 185.27	$ 184.08	$ 176.11	$ 186.57	$ 164.69
Annual savings in GHG from electricity savings [kg CO2e/year]	14.3	14.4	14.3	13.6	14.4	14.4	14.3	13.7	14.5	12.8
Annual savings in natural gas [m3/year]	146.38	148.03	147.87	133.62	148.17	149.53	148.86	135.28	149.83	154.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,356.2	$ 1,371.53	$ 1,370.01	$ 1,237.97	$ 1,372.84	$ 1,385.37	$ 1,379.19	$ 1,253.4	$ 1,388.2	$ 1,430.42
Annual savings in carbon tax for natural gas [$/year]	$ 338.5	$ 342.33	$ 341.95	$ 308.99	$ 342.65	$ 345.78	$ 344.24	$ 312.84	$ 346.49	$ 357.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,694.7	$ 1,713.86	$ 1,711.96	$ 1,546.96	$ 1,715.5	$ 1,731.15	$ 1,723.43	$ 1,566.24	$ 1,734.69	$ 1,787.45
Annual savings in GHG from natural gas savings [kg CO2e/year]	7522.3	7607.3	7598.8	6866.5	7614.5	7684.1	7649.8	6952.1	7699.8	7933.9
Net Present Value [$]	$ 20,779.55	$ 20,711.75	$ 20,564.46	$ 20,549.57	$ 20,527.39	$ 20,497.21	$ 20,487.21	$ 20,484.2	$ 20,460.33	$ 20,427.53
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	5.28	5.28	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 6,040.07	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 6,040.07	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 850.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 550.	$.	$.	$.	$.

LARGE 018WWR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 26,301.17	$ 26,480.46	$ 26,518.96	$ 26,851.17	$ 26,980.46	$ 27,030.46	$ 27,068.96	$ 27,103.98	$ 27,132.42	$ 27,151.17
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 39,504.36	$ 39,773.65	$ 39,831.48	$ 40,330.46	$ 40,524.65	$ 40,599.75	$ 40,657.58	$ 40,710.18	$ 40,752.89	$ 40,781.06
Net Present Value [$]	$ 8,586.6	$ 8,505.36	$ 8,757.54	$ 8,738.66	$ 8,650.47	$ 8,658.39	$ 8,910.33	$ 8,929.68	$ 9,048.24	$ 8,774.9
Incremental dollars per GHG saving	$ 1.67	$ 1.68	$ 1.68	$ 1.69	$ 1.71	$ 1.71	$ 1.71	$ 1.72	$ 1.72	$ 1.71
Auxiliary Energy Required Heating [GJ/yr]	139.5	139.1	139.4	139.5	137.8	139.1	139.4	139.1	138.6	139.5
Annual Energy DHW [GJ/yr]	27.2	27.2	27.2	25.4	27.2	25.4	25.4	27.2	27.2	24.3
Annual Energy Space Heating [GJ/yr]	78	77.7	77.9	78	77.2	77.7	77.9	77.4	77.5	78
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	134.9	134.5	134.8	133.1	134	132.8	133.1	134.2	134.4	132
Design Heating Load [W]	20404.3	20281.7	20472.3	20404.3	20233.6	20281.7	20472.3	19894.8	20312.2	20404.3
Annual Energy Electricity [kWh/yr]	29919.8	29820.6	29903.2	29919.8	29682.1	29820.6	29903.2	29743.5	29776.6	29919.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,170.34	$ 4,156.3	$ 4,167.99	$ 4,170.34	$ 4,136.7	$ 4,156.3	$ 4,167.99	$ 4,145.39	$ 4,150.07	$ 4,170.34
Annual Energy Natural Gas [m3/yr]	730.3	729.7	729.8	682.8	729.9	682.3	682.4	729.6	730.2	651.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 315.03	$ 314.77	$ 314.81	$ 294.54	$ 314.85	$ 294.32	$ 294.36	$ 314.72	$ 314.98	$ 280.95
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43678	45604	45406	43679	45622	45605	45407	49852	43876	43680
Upgrade Package List	Pkg3321202034	Pkg3331202033	Pkg3331201034	Pkg3321202034	Pkg3331202034	Pkg3331202033	Pkg3331201034	Pkg4231302034	Pkg3321203033	Pkg3321202034
GHGI [kg/m2]	3.38	3.38	3.38	3.2	3.37	3.2	3.2	3.37	3.38	3.08
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.8	75.6	75.8	75.8	74.9	75.6	75.8	75.6	75.4	75.8
Output: MEUI [kWh/(m2 * yr)]	59.2	59	59.2	58.2	58.7	58	58.2	58.8	58.9	57.6
Output: Better than ERS (%)	5280.0%	5300.0%	5290.0%	5350.0%	5320.0%	5360.0%	5350.0%	5310.0%	5300.0%	5390.0%
Output: Better than Envelope (%)	2020.0%	2050.0%	2030.0%	2020.0%	2120.0%	2050.0%	2030.0%	2050.0%	2080.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	20287	20188	20271	20287	20050	20188	20271	20111	20144	20287
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,860.51	$ 2,846.52	$ 2,858.17	$ 2,860.51	$ 2,826.99	$ 2,846.52	$ 2,858.17	$ 2,835.65	$ 2,840.32	$ 2,860.51
Annual savings in carbon tax for electricity [$/year]	$ 10.14	$ 10.09	$ 10.14	$ 10.14	$ 10.02	$ 10.09	$ 10.14	$ 10.06	$ 10.07	$ 10.14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,870.65	$ 2,856.62	$ 2,868.3	$ 2,870.65	$ 2,837.02	$ 2,856.62	$ 2,868.3	$ 2,845.71	$ 2,850.39	$ 2,870.65
Annual savings in GHG from electricity savings [kg CO2e/year]	223.2	222.1	223	223.2	220.5	222.1	223	221.2	221.6	223.2
Annual savings in natural gas [m3/year]	311.12	311.14	311.14	312.89	311.13	312.91	312.9	311.15	311.12	314.06
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,882.52	$ 2,882.73	$ 2,882.69	$ 2,898.92	$ 2,882.66	$ 2,899.09	$ 2,899.06	$ 2,882.76	$ 2,882.56	$ 2,909.79
Annual savings in carbon tax for natural gas [$/year]	$ 719.46	$ 719.52	$ 719.51	$ 723.56	$ 719.5	$ 723.6	$ 723.59	$ 719.52	$ 719.47	$ 726.27
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,601.99	$ 3,602.24	$ 3,602.2	$ 3,622.48	$ 3,602.16	$ 3,622.69	$ 3,622.65	$ 3,602.29	$ 3,602.03	$ 3,636.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	15988.1	15989.2	15989	16079	15988.8	16080	16079.8	15989.4	15988.3	16139.3
Net Present Value [$]	$ 8,586.6	$ 8,505.36	$ 8,757.54	$ 8,738.66	$ 8,650.47	$ 8,658.39	$ 8,910.33	$ 8,929.68	$ 9,048.24	$ 8,774.9
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	10.47	8.77	10.47	14.09	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 2,431.75	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 8,845.78	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.	$.	$.	$ 850.

LARGE 018WWR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 26,301.17	$ 26,480.46	$ 26,518.96	$ 27,580.46	$ 26,851.17	$ 27,732.42	$ 27,030.46	$ 27,151.17	$ 27,068.96	$ 26,980.46
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 39,504.36	$ 39,773.65	$ 39,831.48	$ 41,425.85	$ 40,330.46	$ 41,654.09	$ 40,599.75	$ 40,781.06	$ 40,657.58	$ 40,524.65
Net Present Value [$]	$ 8,586.6	$ 8,505.36	$ 8,757.54	$ 6,885.1	$ 8,738.66	$ 7,285.55	$ 8,658.39	$ 8,774.9	$ 8,910.33	$ 8,650.47
Incremental dollars per GHG saving	$ 1.67	$ 1.68	$ 1.68	$ 1.69	$ 1.69	$ 1.7	$ 1.71	$ 1.71	$ 1.71	$ 1.71
Auxiliary Energy Required Heating [GJ/yr]	139.5	139.1	139.4	139	139.5	139.9	139.1	139.5	139.4	137.8
Annual Energy DHW [GJ/yr]	27.2	27.2	27.2	16.2	25.4	16.2	25.4	24.3	25.4	27.2
Annual Energy Space Heating [GJ/yr]	78	77.7	77.9	77.3	78	77.7	77.7	78	77.9	77.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	134.9	134.5	134.8	123.2	133.1	123.5	132.8	132	133.1	134
Design Heating Load [W]	20404.3	20281.7	20472.3	19783.2	20404.3	19861.8	20281.7	20404.3	20472.3	20233.6
Annual Energy Electricity [kWh/yr]	29919.8	29820.6	29903.2	29725.7	29919.8	29822.2	29820.6	29919.8	29903.2	29682.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,170.34	$ 4,156.3	$ 4,167.99	$ 4,142.87	$ 4,170.34	$ 4,156.53	$ 4,156.3	$ 4,170.34	$ 4,167.99	$ 4,136.7
Annual Energy Natural Gas [m3/yr]	730.3	729.7	729.8	434.1	682.8	434.1	682.3	651.3	682.4	729.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 315.03	$ 314.77	$ 314.81	$ 187.26	$ 294.54	$ 187.26	$ 294.32	$ 280.95	$ 294.36	$ 314.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43678	45604	45406	45625	43679	43879	45605	43680	45407	45622
Upgrade Package List	Pkg3321202034	Pkg3331202033	Pkg3331201034	Pkg3331202034	Pkg3321202034	Pkg3321203033	Pkg3331202033	Pkg3321202034	Pkg3331201034	Pkg3331202034
GHGI [kg/m2]	3.38	3.38	3.38	2.27	3.2	2.27	3.2	3.08	3.2	3.37
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.5%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	75.8	75.6	75.8	75.6	75.8	76	75.6	75.8	75.8	74.9
Output: MEUI [kWh/(m2 * yr)]	59.2	59	59.2	52.8	58.2	53	58	57.6	58.2	58.7
Output: Better than ERS (%)	5280.0%	5300.0%	5290.0%	5590.0%	5350.0%	5580.0%	5360.0%	5390.0%	5350.0%	5320.0%
Output: Better than Envelope (%)	2020.0%	2050.0%	2030.0%	2050.0%	2020.0%	2000.0%	2050.0%	2020.0%	2030.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	20287	20188	20271	20093	20287	20190	20188	20287	20271	20050
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 2,860.51	$ 2,846.52	$ 2,858.17	$ 2,833.14	$ 2,860.51	$ 2,846.75	$ 2,846.52	$ 2,860.51	$ 2,858.17	$ 2,826.99
Annual savings in carbon tax for electricity [$/year]	$ 10.14	$ 10.09	$ 10.14	$ 10.05	$ 10.14	$ 10.09	$ 10.09	$ 10.14	$ 10.14	$ 10.02
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,870.65	$ 2,856.62	$ 2,868.3	$ 2,843.19	$ 2,870.65	$ 2,856.84	$ 2,856.62	$ 2,870.65	$ 2,868.3	$ 2,837.02
Annual savings in GHG from electricity savings [kg CO2e/year]	223.2	222.1	223	221	223.2	222.1	222.1	223.2	223	220.5
Annual savings in natural gas [m3/year]	311.12	311.14	311.14	322.16	312.89	322.16	312.91	314.06	312.9	311.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,882.52	$ 2,882.73	$ 2,882.69	$ 2,984.77	$ 2,898.92	$ 2,984.77	$ 2,899.09	$ 2,909.79	$ 2,899.06	$ 2,882.66
Annual savings in carbon tax for natural gas [$/year]	$ 719.46	$ 719.52	$ 719.51	$ 744.98	$ 723.56	$ 744.98	$ 723.6	$ 726.27	$ 723.59	$ 719.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,601.99	$ 3,602.24	$ 3,602.2	$ 3,729.76	$ 3,622.48	$ 3,729.76	$ 3,622.69	$ 3,636.06	$ 3,622.65	$ 3,602.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	15988.1	15989.2	15989	16555.2	16079	16555.2	16080	16139.3	16079.8	15988.8
Net Present Value [$]	$ 8,586.6	$ 8,505.36	$ 8,757.54	$ 6,885.1	$ 8,738.66	$ 7,285.55	$ 8,658.39	$ 8,774.9	$ 8,910.33	$ 8,650.47
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	14.09	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$.

LARGE 018WWR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,274.46	$ 27,626.42	$ 27,755.71	$ 27,805.71	$ 27,926.42	$ 28,105.71	$ 27,913.46	$ 28,305.71	$ 28,605.71	$ 28,265.42
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 40,966.24	$ 41,494.88	$ 41,689.08	$ 41,764.18	$ 41,945.48	$ 42,214.78	$ 41,926.02	$ 42,515.18	$ 42,965.78	$ 42,454.66
Net Present Value [$]	$ 18,081.75	$ 17,612.37	$ 17,566.69	$ 17,539.44	$ 17,535.18	$ 17,462.92	$ 17,442.75	$ 17,352.33	$ 17,275.08	$ 16,973.37
Incremental dollars per GHG saving	$ 2.84	$ 2.88	$ 2.89	$ 2.9	$ 2.9	$ 2.91	$ 2.91	$ 2.93	$ 2.94	$ 2.95
Auxiliary Energy Required Heating [GJ/yr]	132.6	132.1	130.4	131.7	132.1	131.7	132.6	130.4	130.5	132.1
Annual Energy DHW [GJ/yr]	13.7	14.7	16.2	14.7	13.7	13.7	13.7	14.7	13.7	14.7
Annual Energy Space Heating [GJ/yr]	140.4	140	138.2	139.5	140	139.5	140.4	138.2	138.2	140
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	181.5	182	181.7	181.6	181.1	180.6	181.5	180.3	179.3	182
Design Heating Load [W]	18498.8	18529.3	18358.6	18406.7	18529.3	18406.7	18498.8	18358.6	18358.6	18529.3
Annual Energy Electricity [kWh/yr]	8317.2	8314.9	8305.9	8312.7	8315	8312.7	8317.2	8306	8306	8314.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,113.57	$ 1,113.24	$ 1,111.97	$ 1,112.93	$ 1,113.26	$ 1,112.93	$ 1,113.57	$ 1,111.98	$ 1,111.98	$ 1,113.24
Annual Energy Natural Gas [m3/yr]	4069.9	4084.6	4077.4	4072.6	4058	4045.9	4069.9	4037.3	4010.7	4084.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,755.61	$ 1,761.95	$ 1,758.85	$ 1,756.78	$ 1,750.48	$ 1,745.26	$ 1,755.61	$ 1,741.55	$ 1,730.08	$ 1,761.95
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51576	51143	51718	51701	51144	51702	51864	51719	51720	51431
Upgrade Package List	Pkg4331302034	Pkg4321303034	Pkg4331303034	Pkg4331303033	Pkg4321303034	Pkg4331303033	Pkg4331402034	Pkg4331303034	Pkg4331303034	Pkg4321403034
GHGI [kg/m2]	15.43	15.48	15.46	15.44	15.38	15.34	15.43	15.31	15.21	15.48
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	72.1	71.8	70.9	71.6	71.8	71.6	72.1	70.9	70.9	71.8
Output: MEUI [kWh/(m2 * yr)]	84.7	85	84.9	84.8	84.5	84.2	84.7	84.1	83.5	85
Output: Better than ERS (%)	3700.0%	3680.0%	3700.0%	3700.0%	3720.0%	3730.0%	3700.0%	3740.0%	3780.0%	3680.0%
Output: Better than Envelope (%)	2420.0%	2450.0%	2540.0%	2470.0%	2450.0%	2470.0%	2420.0%	2540.0%	2540.0%	2450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1315	1318	1327	1320	1318	1320	1315	1326	1326	1318
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 185.46	$ 185.78	$ 187.05	$ 186.09	$ 185.77	$ 186.09	$ 185.46	$ 187.04	$ 187.04	$ 185.78
Annual savings in carbon tax for electricity [$/year]	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 186.11	$ 186.44	$ 187.71	$ 186.75	$ 186.43	$ 186.75	$ 186.11	$ 187.7	$ 187.7	$ 186.44
Annual savings in GHG from electricity savings [kg CO2e/year]	14.5	14.5	14.6	14.5	14.5	14.5	14.5	14.6	14.6	14.5
Annual savings in natural gas [m3/year]	186.69	186.14	186.41	186.59	187.13	187.58	186.69	187.9	188.9	186.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,729.68	$ 1,724.6	$ 1,727.09	$ 1,728.75	$ 1,733.79	$ 1,737.96	$ 1,729.68	$ 1,740.93	$ 1,750.11	$ 1,724.6
Annual savings in carbon tax for natural gas [$/year]	$ 431.72	$ 430.45	$ 431.07	$ 431.49	$ 432.74	$ 433.79	$ 431.72	$ 434.53	$ 436.82	$ 430.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,161.4	$ 2,155.06	$ 2,158.16	$ 2,160.23	$ 2,166.53	$ 2,171.75	$ 2,161.4	$ 2,175.46	$ 2,186.94	$ 2,155.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	9593.8	9565.6	9579.4	9588.6	9616.6	9639.7	9593.8	9656.2	9707.1	9565.6
Net Present Value [$]	$ 18,081.75	$ 17,612.37	$ 17,566.69	$ 17,539.44	$ 17,535.18	$ 17,462.92	$ 17,442.75	$ 17,352.33	$ 17,275.08	$ 16,973.37
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	14.09	14.09	14.09	14.09	14.09	10.47	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,774.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.

LARGE 018WWR Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 55,529.47	$ 56,029.47	$ 56,079.47	$ 56,168.47	$ 56,299.58	$ 56,379.47	$ 56,579.47	$ 56,629.47	$ 56,668.47	$ 56,718.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 83,405.26	$ 84,156.26	$ 84,231.36	$ 84,365.04	$ 84,561.97	$ 84,681.96	$ 84,982.36	$ 85,057.46	$ 85,116.04	$ 85,191.14
Net Present Value [$]	$ 23,746.78	$ 23,885.31	$ 23,899.81	$ 24,385.78	$ 24,498.75	$ 23,935.81	$ 24,038.1	$ 22,113.7	$ 24,524.31	$ 24,538.81
Incremental dollars per GHG saving	$ 3.51	$ 3.54	$ 3.52	$ 3.55	$ 3.56	$ 3.53	$ 3.55	$ 3.45	$ 3.58	$ 3.56
Auxiliary Energy Required Heating [GJ/yr]	104.8	103.5	104.8	104.8	104.5	104.8	103.5	104.7	103.5	104.8
Annual Energy DHW [GJ/yr]	27.1	27.1	25.4	27.1	27.1	24.2	25.4	16.2	27.1	25.4
Annual Energy Space Heating [GJ/yr]	58.7	58.1	58.7	58.7	58.6	58.7	58.1	58.4	58.1	58.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	115.2	114.7	113.4	115.2	115.2	112.2	112.9	103.9	114.7	113.4
Design Heating Load [W]	15591	15542.9	15591	15591	15564.5	15591	15542.9	15107.5	15542.9	15591
Annual Energy Electricity [kWh/yr]	24461.8	24320.7	24461.8	24461.8	24455.1	24461.8	24320.7	24357.4	24320.7	24461.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,398.03	$ 3,378.06	$ 3,398.03	$ 3,398.03	$ 3,397.08	$ 3,398.03	$ 3,378.06	$ 3,383.26	$ 3,378.06	$ 3,398.03
Annual Energy Natural Gas [m3/yr]	728.3	728.5	680.9	728.3	728.2	649.4	681.1	434.1	728.5	680.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.16	$ 314.25	$ 293.72	$ 314.16	$ 314.12	$ 280.13	$ 293.8	$ 187.26	$ 314.25	$ 293.72
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51814	51832	51815	52102	52264	51816	51833	51835	52120	52103
Upgrade Package List	Pkg4331303063	Pkg4331303064	Pkg4331303063	Pkg4331403063	Pkg4341302064	Pkg4331303063	Pkg4331303064	Pkg4331303064	Pkg4331403064	Pkg4331403063
GHGI [kg/m2]	3.26	3.25	3.08	3.26	3.25	2.96	3.08	2.15	3.25	3.08
% ICC	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	57	56.3	57	57	56.8	57	56.3	56.9	56.3	57
Output: MEUI [kWh/(m2 * yr)]	48.5	48.3	47.6	48.5	48.5	46.9	47.3	42.4	48.3	47.6
Output: Better than ERS (%)	5970.0%	5990.0%	6040.0%	5970.0%	5970.0%	6080.0%	6050.0%	6280.0%	5990.0%	6040.0%
Output: Better than Envelope (%)	4010.0%	4080.0%	4010.0%	4010.0%	4030.0%	4010.0%	4080.0%	4010.0%	4080.0%	4010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14829	14688	14829	14829	14823	14829	14688	14725	14688	14829
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,090.93	$ 2,071.04	$ 2,090.93	$ 2,090.93	$ 2,089.99	$ 2,090.93	$ 2,071.04	$ 2,076.21	$ 2,071.04	$ 2,090.93
Annual savings in carbon tax for electricity [$/year]	$ 7.41	$ 7.34	$ 7.41	$ 7.41	$ 7.41	$ 7.41	$ 7.34	$ 7.36	$ 7.34	$ 7.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,098.35	$ 2,078.38	$ 2,098.35	$ 2,098.35	$ 2,097.4	$ 2,098.35	$ 2,078.38	$ 2,083.57	$ 2,078.38	$ 2,098.35
Annual savings in GHG from electricity savings [kg CO2e/year]	163.1	161.6	163.1	163.1	163	163.1	161.6	162	161.6	163.1
Annual savings in natural gas [m3/year]	311.19	311.19	312.96	311.19	311.2	314.13	312.95	322.16	311.19	312.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,883.21	$ 2,883.14	$ 2,899.57	$ 2,883.21	$ 2,883.25	$ 2,910.45	$ 2,899.51	$ 2,984.77	$ 2,883.14	$ 2,899.57
Annual savings in carbon tax for natural gas [$/year]	$ 719.64	$ 719.62	$ 723.72	$ 719.64	$ 719.64	$ 726.43	$ 723.7	$ 744.98	$ 719.62	$ 723.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,602.85	$ 3,602.76	$ 3,623.29	$ 3,602.85	$ 3,602.89	$ 3,636.88	$ 3,623.21	$ 3,729.76	$ 3,602.76	$ 3,623.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	15991.9	15991.5	16082.7	15991.9	15992.1	16143	16082.3	16555.2	15991.5	16082.7
Net Present Value [$]	$ 23,746.78	$ 23,885.31	$ 23,899.81	$ 24,385.78	$ 24,498.75	$ 23,935.81	$ 24,038.1	$ 22,113.7	$ 24,524.31	$ 24,538.81
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	10.47	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 550.

LARGE 018WWR Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 56,629.47	$ 57,179.47	$ 57,479.47	$ 57,268.47	$ 55,529.47	$ 57,818.47	$ 58,118.47	$ 57,730.83	$ 56,079.47	$ 56,379.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 85,057.46	$ 85,883.56	$ 86,334.16	$ 86,017.24	$ 83,405.26	$ 86,843.34	$ 87,293.94	$ 86,711.71	$ 84,231.36	$ 84,681.96
Net Present Value [$]	$ 22,113.7	$ 22,329.59	$ 22,407.52	$ 22,752.7	$ 23,746.78	$ 22,968.59	$ 23,046.52	$ 23,158.09	$ 23,899.81	$ 23,935.81
Incremental dollars per GHG saving	$ 3.45	$ 3.47	$ 3.48	$ 3.49	$ 3.51	$ 3.51	$ 3.52	$ 3.52	$ 3.52	$ 3.53
Auxiliary Energy Required Heating [GJ/yr]	104.7	104.7	104.7	104.7	104.8	104.7	104.7	104.8	104.8	104.8
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	16.2	27.1	14.7	13.7	16.2	25.4	24.2
Annual Energy Space Heating [GJ/yr]	58.4	58.4	58.4	58.4	58.7	58.4	58.4	58.3	58.7	58.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	103.9	102.4	101.4	103.9	115.2	102.4	101.4	103.8	113.4	112.2
Design Heating Load [W]	15107.5	15107.5	15107.5	15107.5	15591	15107.5	15107.5	15037	15591	15591
Annual Energy Electricity [kWh/yr]	24357.4	24359.1	24360.3	24357.4	24461.8	24359.1	24360.3	24335.3	24461.8	24461.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,383.26	$ 3,383.5	$ 3,383.67	$ 3,383.26	$ 3,398.03	$ 3,383.5	$ 3,383.67	$ 3,380.13	$ 3,398.03	$ 3,398.03
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	434.1	728.3	393.7	366.8	434.1	680.9	649.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 314.16	$ 169.83	$ 158.22	$ 187.26	$ 293.72	$ 280.13
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51835	51836	51837	52123	51814	52124	52125	52393	51815	51816
Upgrade Package List	Pkg4331303064	Pkg4331303064	Pkg4331303064	Pkg4331403064	Pkg4331303063	Pkg4331403064	Pkg4331403064	Pkg4341303063	Pkg4331303063	Pkg4331303063
GHGI [kg/m2]	2.15	2	1.9	2.15	3.26	2	1.9	2.15	3.08	2.96
% ICC	5.0%	5.1%	5.1%	5.1%	4.9%	5.1%	5.2%	5.1%	5.0%	5.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.9	56.9	56.9	56.9	57	56.9	56.9	57	57	57
Output: MEUI [kWh/(m2 * yr)]	42.4	41.6	41	42.4	48.5	41.6	41	42.3	47.6	46.9
Output: Better than ERS (%)	6280.0%	6330.0%	6370.0%	6280.0%	5970.0%	6330.0%	6370.0%	6280.0%	6040.0%	6080.0%
Output: Better than Envelope (%)	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14725	14727	14728	14725	14829	14727	14728	14703	14829	14829
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,076.21	$ 2,076.45	$ 2,076.62	$ 2,076.21	$ 2,090.93	$ 2,076.45	$ 2,076.62	$ 2,073.09	$ 2,090.93	$ 2,090.93
Annual savings in carbon tax for electricity [$/year]	$ 7.36	$ 7.36	$ 7.36	$ 7.36	$ 7.41	$ 7.36	$ 7.36	$ 7.35	$ 7.41	$ 7.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,083.57	$ 2,083.81	$ 2,083.98	$ 2,083.57	$ 2,098.35	$ 2,083.81	$ 2,083.98	$ 2,080.45	$ 2,098.35	$ 2,098.35
Annual savings in GHG from electricity savings [kg CO2e/year]	162	162	162	162	163.1	162	162	161.7	163.1	163.1
Annual savings in natural gas [m3/year]	322.16	323.66	324.66	322.16	311.19	323.66	324.66	322.16	312.96	314.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,984.77	$ 2,998.72	$ 3,008.	$ 2,984.77	$ 2,883.21	$ 2,998.72	$ 3,008.	$ 2,984.77	$ 2,899.57	$ 2,910.45
Annual savings in carbon tax for natural gas [$/year]	$ 744.98	$ 748.47	$ 750.78	$ 744.98	$ 719.64	$ 748.47	$ 750.78	$ 744.98	$ 723.72	$ 726.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,729.76	$ 3,747.18	$ 3,758.79	$ 3,729.76	$ 3,602.85	$ 3,747.18	$ 3,758.79	$ 3,729.76	$ 3,623.29	$ 3,636.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	16555.2	16632.6	16684.1	16555.2	15991.9	16632.6	16684.1	16555.2	16082.7	16143
Net Present Value [$]	$ 22,113.7	$ 22,329.59	$ 22,407.52	$ 22,752.7	$ 23,746.78	$ 22,968.59	$ 23,046.52	$ 23,158.09	$ 23,899.81	$ 23,935.81
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.

LARGE 018WWR Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 56,629.47	$ 57,179.47	$ 57,479.47	$ 57,268.47	$ 57,818.47	$ 58,118.47	$ 57,730.83	$ 58,230.83	$ 58,280.83	$ 58,580.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 85,057.46	$ 85,883.56	$ 86,334.16	$ 86,017.24	$ 86,843.34	$ 87,293.94	$ 86,711.71	$ 87,462.71	$ 87,537.81	$ 87,988.41
Net Present Value [$]	$ 22,113.7	$ 22,329.59	$ 22,407.52	$ 22,752.7	$ 22,968.59	$ 23,046.52	$ 23,158.09	$ 23,286.9	$ 23,374.35	$ 23,452.28
Incremental dollars per GHG saving	$ 3.45	$ 3.47	$ 3.48	$ 3.49	$ 3.51	$ 3.52	$ 3.52	$ 3.55	$ 3.54	$ 3.55
Auxiliary Energy Required Heating [GJ/yr]	104.7	104.7	104.7	104.7	104.7	104.7	104.8	103.5	104.8	104.8
Annual Energy DHW [GJ/yr]	16.2	14.7	13.7	16.2	14.7	13.7	16.2	16.2	14.7	13.7
Annual Energy Space Heating [GJ/yr]	58.4	58.4	58.4	58.4	58.4	58.4	58.3	57.8	58.3	58.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	103.9	102.4	101.4	103.9	102.4	101.4	103.8	103.3	102.3	101.3
Design Heating Load [W]	15107.5	15107.5	15107.5	15107.5	15107.5	15107.5	15037	14988.9	15037	15037
Annual Energy Electricity [kWh/yr]	24357.4	24359.1	24360.3	24357.4	24359.1	24360.3	24335.3	24191.1	24337.1	24338.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,383.26	$ 3,383.5	$ 3,383.67	$ 3,383.26	$ 3,383.5	$ 3,383.67	$ 3,380.13	$ 3,359.73	$ 3,380.38	$ 3,380.55
Annual Energy Natural Gas [m3/yr]	434.1	393.7	366.8	434.1	393.7	366.8	434.1	434.1	393.7	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 187.26	$ 169.83	$ 158.22
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51835	51836	51837	52123	52124	52125	52393	52411	52394	52395
Upgrade Package List	Pkg4331303064	Pkg4331303064	Pkg4331303064	Pkg4331403064	Pkg4331403064	Pkg4331403064	Pkg4341303063	Pkg4341303064	Pkg4341303063	Pkg4341303063
GHGI [kg/m2]	2.15	2	1.9	2.15	2	1.9	2.15	2.15	2	1.9
% ICC	5.0%	5.1%	5.1%	5.1%	5.1%	5.2%	5.1%	5.2%	5.2%	5.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.9	56.9	56.9	56.9	56.9	56.9	57	56.3	57	57
Output: MEUI [kWh/(m2 * yr)]	42.4	41.6	41	42.4	41.6	41	42.3	42.1	41.5	41
Output: Better than ERS (%)	6280.0%	6330.0%	6370.0%	6280.0%	6330.0%	6370.0%	6280.0%	6300.0%	6330.0%	6370.0%
Output: Better than Envelope (%)	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4010.0%	4080.0%	4010.0%	4010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14725	14727	14728	14725	14727	14728	14703	14559	14705	14706
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,076.21	$ 2,076.45	$ 2,076.62	$ 2,076.21	$ 2,076.45	$ 2,076.62	$ 2,073.09	$ 2,052.76	$ 2,073.35	$ 2,073.52
Annual savings in carbon tax for electricity [$/year]	$ 7.36	$ 7.36	$ 7.36	$ 7.36	$ 7.36	$ 7.36	$ 7.35	$ 7.28	$ 7.35	$ 7.35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,083.57	$ 2,083.81	$ 2,083.98	$ 2,083.57	$ 2,083.81	$ 2,083.98	$ 2,080.45	$ 2,060.04	$ 2,080.7	$ 2,080.87
Annual savings in GHG from electricity savings [kg CO2e/year]	162	162	162	162	162	162	161.7	160.1	161.8	161.8
Annual savings in natural gas [m3/year]	322.16	323.66	324.66	322.16	323.66	324.66	322.16	322.16	323.66	324.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,984.77	$ 2,998.72	$ 3,008.	$ 2,984.77	$ 2,998.72	$ 3,008.	$ 2,984.77	$ 2,984.77	$ 2,998.72	$ 3,008.
Annual savings in carbon tax for natural gas [$/year]	$ 744.98	$ 748.47	$ 750.78	$ 744.98	$ 748.47	$ 750.78	$ 744.98	$ 744.98	$ 748.47	$ 750.78
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,729.76	$ 3,747.18	$ 3,758.79	$ 3,729.76	$ 3,747.18	$ 3,758.79	$ 3,729.76	$ 3,729.76	$ 3,747.18	$ 3,758.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	16555.2	16632.6	16684.1	16555.2	16632.6	16684.1	16555.2	16555.2	16632.6	16684.1
Net Present Value [$]	$ 22,113.7	$ 22,329.59	$ 22,407.52	$ 22,752.7	$ 22,968.59	$ 23,046.52	$ 23,158.09	$ 23,286.9	$ 23,374.35	$ 23,452.28
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96	$ 29,371.96
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.

LARGE 018WWR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,031.73	$ 14,333.23	$ 14,421.73	$ 14,443.23	$ 14,471.73	$ 14,493.23	$ 14,551.02	$ 14,572.52	$ 14,581.73	$ 14,661.02
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,075.66	$ 21,528.51	$ 21,661.44	$ 21,693.73	$ 21,736.54	$ 21,768.83	$ 21,855.63	$ 21,887.93	$ 21,901.76	$ 22,020.85
Net Present Value [$]	$ 23,891.05	$ 22,428.91	$ 22,320.8	$ 22,040.65	$ 24,144.11	$ 23,861.17	$ 22,248.86	$ 21,969.5	$ 23,687.6	$ 21,861.39
Incremental dollars per GHG saving	$ 1.76	$ 1.86	$ 1.87	$ 1.89	$ 1.78	$ 1.79	$ 1.89	$ 1.9	$ 1.81	$ 1.92
Auxiliary Energy Required Heating [GJ/yr]	206.3	201	202.7	203.7	203.5	204.6	200.8	201.9	206.3	203.6
Annual Energy DHW [GJ/yr]	16.5	27.6	25.7	25.7	16.5	16.5	27.5	27.5	14.9	25.7
Annual Energy Space Heating [GJ/yr]	218.6	212.9	214.7	215.8	215.6	216.7	212.7	213.8	218.6	215.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	262.5	267.8	267.9	269	259.5	260.6	267.7	268.8	260.9	268.8
Design Heating Load [W]	25309.2	25316.5	25567	25552	25073.7	25058.7	25393.5	25378.6	25309.2	25629
Annual Energy Electricity [kWh/yr]	8707.3	8678.9	8688.1	8693.6	8692.5	8698.1	8678.2	8683.7	8707.4	8692.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,168.77	$ 1,164.75	$ 1,166.05	$ 1,166.83	$ 1,166.67	$ 1,167.47	$ 1,164.65	$ 1,165.43	$ 1,168.78	$ 1,166.73
Annual Energy Natural Gas [m3/yr]	6205.9	6353.2	6352.7	6381.9	6127.7	6157.2	6348.9	6378	6164.5	6377.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,677.01	$ 2,740.55	$ 2,740.33	$ 2,752.93	$ 2,643.28	$ 2,656.	$ 2,738.69	$ 2,751.25	$ 2,659.15	$ 2,751.03
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	116878	117163	116894	117146	116896	117148	118513	118765	116879	118496
Upgrade Package List	Pkg2121101032	Pkg2121102033	Pkg2121101033	Pkg2121102032	Pkg2121101033	Pkg2121102032	Pkg2131101033	Pkg2131102032	Pkg2121101032	Pkg2131101032
GHGI [kg/m2]	23.44	23.99	23.99	24.1	23.15	23.26	23.98	24.09	23.29	24.08
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	112.2	109.2	110.2	110.8	110.6	111.2	109.2	109.7	112.2	110.7
Output: MEUI [kWh/(m2 * yr)]	128.7	131.7	131.7	132.3	127.1	127.7	131.6	132.2	127.9	132.2
Output: Better than ERS (%)	2030.0%	2040.0%	2040.0%	2010.0%	2120.0%	2080.0%	2050.0%	2010.0%	2070.0%	2010.0%
Output: Better than Envelope (%)	210.0%	50.0%	30.0%	80.0%	70.0%	120.0%	60.0%	10.0%	210.0%	70.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1182	1210	1201	1196	1197	1191	1211	1205	1182	1196
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 166.63	$ 170.64	$ 169.34	$ 168.57	$ 168.72	$ 167.93	$ 170.74	$ 169.96	$ 166.62	$ 168.66
Annual savings in carbon tax for electricity [$/year]	$ .59	$ .61	$ .6	$ .6	$ .6	$ .6	$ .61	$ .6	$ .59	$ .6
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 167.22	$ 171.24	$ 169.94	$ 169.16	$ 169.32	$ 168.53	$ 171.34	$ 170.56	$ 167.21	$ 169.26
Annual savings in GHG from electricity savings [kg CO2e/year]	13	13.3	13.2	13.2	13.2	13.1	13.3	13.3	13	13.2
Annual savings in natural gas [m3/year]	155.15	149.67	149.68	148.6	158.07	156.97	149.83	148.74	156.7	148.76
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,437.5	$ 1,386.65	$ 1,386.82	$ 1,376.74	$ 1,464.49	$ 1,454.31	$ 1,388.13	$ 1,378.09	$ 1,451.79	$ 1,378.26
Annual savings in carbon tax for natural gas [$/year]	$ 358.79	$ 346.1	$ 346.14	$ 343.63	$ 365.53	$ 362.99	$ 346.47	$ 343.96	$ 362.36	$ 344.01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,796.29	$ 1,732.75	$ 1,732.97	$ 1,720.37	$ 1,830.02	$ 1,817.3	$ 1,734.61	$ 1,722.05	$ 1,814.15	$ 1,722.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	7973.2	7691.1	7692.1	7636.2	8122.9	8066.4	7699.4	7643.7	8052.4	7644.6
Net Present Value [$]	$ 23,891.05	$ 22,428.91	$ 22,320.8	$ 22,040.65	$ 24,144.11	$ 23,861.17	$ 22,248.86	$ 21,969.5	$ 23,687.6	$ 21,861.39
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$.	$.	$ 550.	$ 550.

LARGE 018WWR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,362.52	$ 16,581.73	$ 17,181.73	$ 16,912.52	$ 17,021.73	$ 17,043.23	$ 17,131.73	$ 17,212.52	$ 17,621.73	$ 17,643.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,576.51	$ 24,905.76	$ 25,806.96	$ 25,402.61	$ 25,566.64	$ 25,598.93	$ 25,731.86	$ 25,853.21	$ 26,467.84	$ 26,500.13
Net Present Value [$]	$ 24,339.13	$ 24,368.01	$ 22,306.37	$ 24,478.82	$ 23,667.28	$ 24,135.2	$ 24,507.7	$ 24,504.87	$ 21,601.19	$ 22,082.26
Incremental dollars per GHG saving	$ .91	$ .92	$ .92	$ .93	$ .94	$ .94	$ .94	$ .95	$ .95	$ .95
Auxiliary Energy Required Heating [GJ/yr]	207	205	205.8	207	202.2	203.3	205	207	203	204.1
Annual Energy DHW [GJ/yr]	27.6	27.6	16.5	25.7	27.6	27.6	25.8	24.5	16.5	16.5
Annual Energy Space Heating [GJ/yr]	131.4	130.5	130.2	131.4	128.9	129.5	130.5	131.4	128.6	129.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.8	1.8	1.2	1.8	1.8	1.8	1.2	1.8	1.8
Total Energy [GJ/yr]	187.1	186.9	175.5	185.3	185.3	185.9	185	184.1	173.9	174.6
Design Heating Load [W]	26408.4	25907	25412.8	26408.4	25671.5	25656.6	25907	26408.4	25177.3	25162.4
Annual Energy Electricity [kWh/yr]	44320	44244.5	44179.8	44320	43801	43974.4	44244.5	44320	43735	43913.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,207.96	$ 6,197.28	$ 6,188.13	$ 6,207.96	$ 6,134.53	$ 6,159.06	$ 6,197.28	$ 6,207.96	$ 6,125.19	$ 6,150.45
Annual Energy Natural Gas [m3/yr]	740	740.5	442.6	691	740.6	740.6	691.5	658.3	442.6	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.21	$ 319.43	$ 190.92	$ 298.07	$ 319.47	$ 319.47	$ 298.29	$ 283.97	$ 190.92	$ 190.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	118756	116884	116887	118757	116902	117154	116885	118758	116905	117157
Upgrade Package List	Pkg2131102031	Pkg2121101032	Pkg2121101032	Pkg2131102031	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2131102031	Pkg2121101033	Pkg2121102032
GHGI [kg/m2]	3.73	3.73	2.61	3.54	3.72	3.72	3.54	3.42	2.6	2.6
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	112.5	111.5	111.9	112.5	109.9	110.5	111.5	112.5	110.4	110.9
Output: MEUI [kWh/(m2 * yr)]	87.7	87.5	81.4	86.7	86.7	87	86.5	86	80.5	80.8
Output: Better than ERS (%)	4240.0%	4250.0%	4470.0%	4290.0%	4290.0%	4280.0%	4300.0%	4330.0%	4520.0%	4500.0%
Output: Better than Envelope (%)	240.0%	140.0%	180.0%	240.0%	0.0%	60.0%	140.0%	240.0%	40.0%	100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	34431	34355	34291	34431	33912	34085	34355	34431	33846	34024
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,854.76	$ 4,844.11	$ 4,834.99	$ 4,854.76	$ 4,781.58	$ 4,806.03	$ 4,844.11	$ 4,854.76	$ 4,772.27	$ 4,797.44
Annual savings in carbon tax for electricity [$/year]	$ 17.22	$ 17.18	$ 17.15	$ 17.22	$ 16.96	$ 17.04	$ 17.18	$ 17.22	$ 16.92	$ 17.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,871.97	$ 4,861.29	$ 4,852.13	$ 4,871.97	$ 4,798.53	$ 4,823.07	$ 4,861.29	$ 4,871.97	$ 4,789.19	$ 4,814.45
Annual savings in GHG from electricity savings [kg CO2e/year]	378.7	377.9	377.2	378.7	373	374.9	377.9	378.7	372.3	374.3
Annual savings in natural gas [m3/year]	358.81	358.79	369.89	360.63	358.78	358.78	360.61	361.85	369.89	369.89
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,324.35	$ 3,324.18	$ 3,427.01	$ 3,341.26	$ 3,324.14	$ 3,324.14	$ 3,341.09	$ 3,352.55	$ 3,427.01	$ 3,427.01
Annual savings in carbon tax for natural gas [$/year]	$ 829.74	$ 829.7	$ 855.37	$ 833.96	$ 829.69	$ 829.69	$ 833.92	$ 836.78	$ 855.37	$ 855.37
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,154.09	$ 4,153.87	$ 4,282.38	$ 4,175.23	$ 4,153.83	$ 4,153.83	$ 4,175.01	$ 4,189.33	$ 4,282.38	$ 4,282.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	18438.7	18437.7	19008.1	18532.5	18437.6	18437.6	18531.6	18595.1	19008.1	19008.1
Net Present Value [$]	$ 24,339.13	$ 24,368.01	$ 22,306.37	$ 24,478.82	$ 23,667.28	$ 24,135.2	$ 24,507.7	$ 24,504.87	$ 21,601.19	$ 22,082.26
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07	$ 6,040.07
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 1,360.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$.

LARGE 018WWR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,477.44	$ 15,938.94	$ 17,277.44	$ 16,027.44	$ 16,156.73	$ 17,738.94	$ 16,488.94	$ 16,618.23	$ 16,327.44	$ 16,788.94
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,247.11	$ 23,940.29	$ 25,950.71	$ 24,073.21	$ 24,267.41	$ 26,643.89	$ 24,766.39	$ 24,960.58	$ 24,523.81	$ 25,216.99
Net Present Value [$]	$ 24,912.63	$ 24,880.69	$ 24,734.96	$ 24,708.28	$ 24,702.16	$ 24,701.69	$ 24,677.43	$ 24,670.58	$ 24,639.1	$ 24,608.49
Incremental dollars per GHG saving	$ 1.84	$ 1.87	$ 1.95	$ 1.89	$ 1.9	$ 1.98	$ 1.92	$ 1.93	$ 1.91	$ 1.94
Auxiliary Energy Required Heating [GJ/yr]	198.2	196.4	189.8	198.2	196.3	188.1	196.4	194.5	198.2	196.5
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	16.5	16.5	14.9	16.5	13.9	13.9
Annual Energy Space Heating [GJ/yr]	209.9	208.1	201.1	209.9	207.9	199.2	208.1	206.1	209.9	208.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.8	1.2	1.2	1.8	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	253.2	251.3	245	251.6	251.2	243.1	249.8	249.3	250.6	248.8
Design Heating Load [W]	24895.8	24645.3	23735	24895.8	24722.3	23484.6	24645.3	24471.9	24895.8	24645.3
Annual Energy Electricity [kWh/yr]	8491.1	8482	8620	8491.2	8481.1	8610.8	8482	8471.9	8491.3	8482.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,138.18	$ 1,136.89	$ 1,156.42	$ 1,138.19	$ 1,136.76	$ 1,155.11	$ 1,136.89	$ 1,135.46	$ 1,138.2	$ 1,136.9
Annual Energy Natural Gas [m3/yr]	5977.8	5929.3	5744.5	5936.5	5924.9	5696.2	5887.9	5876.4	5908.9	5860.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,578.61	$ 2,557.69	$ 2,477.98	$ 2,560.8	$ 2,555.8	$ 2,457.14	$ 2,539.83	$ 2,534.87	$ 2,548.89	$ 2,527.93
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	123232	123502	123268	123233	126364	123538	123503	126634	123234	123504
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101033	Pkg2221101031	Pkg2231101031	Pkg2221102033	Pkg2221102031	Pkg2231102031	Pkg2221101031	Pkg2221102031
GHGI [kg/m2]	22.58	22.4	21.71	22.43	22.38	21.53	22.24	22.2	22.32	22.14
% ICC	1.4%	1.4%	1.5%	1.4%	1.4%	1.6%	1.5%	1.5%	1.4%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	107.7	106.8	103.2	107.7	106.7	102.2	106.8	105.7	107.7	106.8
Output: MEUI [kWh/(m2 * yr)]	123.7	122.7	119.2	122.9	122.6	118.2	121.9	121.6	122.3	121.3
Output: Better than ERS (%)	2310.0%	2370.0%	2560.0%	2360.0%	2370.0%	2620.0%	2410.0%	2430.0%	2390.0%	2440.0%
Output: Better than Envelope (%)	190.0%	280.0%	610.0%	190.0%	290.0%	690.0%	280.0%	380.0%	190.0%	280.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1398	1407	1269	1398	1408	1278	1407	1417	1398	1407
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 197.12	$ 198.4	$ 178.94	$ 197.1	$ 198.53	$ 180.24	$ 198.4	$ 199.83	$ 197.09	$ 198.39
Annual savings in carbon tax for electricity [$/year]	$ .7	$ .7	$ .63	$ .7	$ .7	$ .64	$ .7	$ .71	$ .7	$ .7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 197.82	$ 199.1	$ 179.58	$ 197.8	$ 199.23	$ 180.88	$ 199.1	$ 200.53	$ 197.79	$ 199.09
Annual savings in GHG from electricity savings [kg CO2e/year]	15.4	15.5	14	15.4	15.5	14.1	15.5	15.6	15.4	15.5
Annual savings in natural gas [m3/year]	163.65	165.46	172.34	165.19	165.62	174.14	167	167.43	166.22	168.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,516.24	$ 1,532.98	$ 1,596.78	$ 1,530.5	$ 1,534.5	$ 1,613.45	$ 1,547.27	$ 1,551.24	$ 1,540.02	$ 1,556.8
Annual savings in carbon tax for natural gas [$/year]	$ 378.45	$ 382.62	$ 398.55	$ 382.	$ 383.	$ 402.71	$ 386.19	$ 387.18	$ 384.38	$ 388.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,894.69	$ 1,915.61	$ 1,995.32	$ 1,912.5	$ 1,917.5	$ 2,016.16	$ 1,933.46	$ 1,938.43	$ 1,924.41	$ 1,945.37
Annual savings in GHG from natural gas savings [kg CO2e/year]	8409.9	8502.8	8856.6	8489	8511.2	8949.1	8582	8604.1	8541.8	8634.9
Net Present Value [$]	$ 24,912.63	$ 24,880.69	$ 24,734.96	$ 24,708.28	$ 24,702.16	$ 24,701.69	$ 24,677.43	$ 24,670.58	$ 24,639.1	$ 24,608.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78	$ 8,845.78
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	HRV sre 75	NA	NA	HRV sre 75	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$.	$.	$ 1,800.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$ 850.

LARGE 018WWR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 26,424.46	$ 26,474.46	$ 26,595.17	$ 26,774.46	$ 26,974.46	$ 27,063.46	$ 27,076.42	$ 27,113.46	$ 27,126.42	$ 27,234.17
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 39,689.54	$ 39,764.64	$ 39,945.95	$ 40,215.24	$ 40,515.64	$ 40,649.32	$ 40,668.78	$ 40,724.42	$ 40,743.88	$ 40,905.72
Net Present Value [$]	$ 23,840.55	$ 23,843.21	$ 23,784.11	$ 23,773.85	$ 23,636.57	$ 23,201.55	$ 23,298.9	$ 23,204.21	$ 23,298.28	$ 23,145.11
Incremental dollars per GHG saving	$ 2.48	$ 2.48	$ 2.49	$ 2.5	$ 2.51	$ 2.54	$ 2.54	$ 2.54	$ 2.54	$ 2.55
Auxiliary Energy Required Heating [GJ/yr]	156.5	157.7	158.4	157.7	156.5	156.5	156	157.7	157.2	158.4
Annual Energy DHW [GJ/yr]	16.5	14.9	13.9	13.9	14.9	16.5	16.5	14.9	14.9	13.9
Annual Energy Space Heating [GJ/yr]	165.7	167	167.8	167	165.8	165.7	165.3	167	166.6	167.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	209.6	209.4	209.1	208.3	208.1	209.6	209.2	209.4	208.9	209.1
Design Heating Load [W]	19397.8	19448.3	19571.3	19448.3	19397.8	19424.2	19448.3	19448.3	19474.7	19571.3
Annual Energy Electricity [kWh/yr]	8443.8	8450.1	8453.8	8450.2	8443.8	8443.8	8441.4	8450.1	8447.8	8453.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,131.48	$ 1,132.37	$ 1,132.9	$ 1,132.39	$ 1,131.48	$ 1,131.48	$ 1,131.14	$ 1,132.37	$ 1,132.05	$ 1,132.9
Annual Energy Natural Gas [m3/yr]	4813.4	4805.2	4796.7	4777.6	4772.1	4813.4	4801	4805.2	4793.1	4796.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,076.33	$ 2,072.8	$ 2,069.13	$ 2,060.89	$ 2,058.52	$ 2,076.33	$ 2,070.98	$ 2,072.8	$ 2,067.58	$ 2,069.13
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	156982	156965	156408	156966	156983	157270	156550	157253	156533	156696
Upgrade Package List	Pkg4331302034	Pkg4331302033	Pkg4321302034	Pkg4331302033	Pkg4331302034	Pkg4331402034	Pkg4321303034	Pkg4331402033	Pkg4321303033	Pkg4321402034
GHGI [kg/m2]	18.22	18.19	18.16	18.08	18.06	18.22	18.17	18.19	18.14	18.16
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	85.1	85.7	86.1	85.7	85.1	85.1	84.8	85.7	85.5	86.1
Output: MEUI [kWh/(m2 * yr)]	100	99.9	99.7	99.3	99.2	100	99.8	99.9	99.6	99.7
Output: Better than ERS (%)	3630.0%	3640.0%	3650.0%	3670.0%	3680.0%	3630.0%	3650.0%	3640.0%	3650.0%	3650.0%
Output: Better than Envelope (%)	2260.0%	2200.0%	2160.0%	2200.0%	2260.0%	2260.0%	2280.0%	2200.0%	2220.0%	2160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1445	1439	1435	1439	1445	1445	1448	1439	1441	1435
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 203.79	$ 202.9	$ 202.38	$ 202.88	$ 203.79	$ 203.79	$ 204.13	$ 202.9	$ 203.22	$ 202.38
Annual savings in carbon tax for electricity [$/year]	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 204.51	$ 203.62	$ 203.09	$ 203.6	$ 204.51	$ 204.51	$ 204.85	$ 203.62	$ 203.94	$ 203.09
Annual savings in GHG from electricity savings [kg CO2e/year]	15.9	15.8	15.8	15.8	15.9	15.9	15.9	15.8	15.9	15.8
Annual savings in natural gas [m3/year]	207.04	207.34	207.66	208.37	208.58	207.04	207.5	207.34	207.79	207.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,918.19	$ 1,921.03	$ 1,923.96	$ 1,930.55	$ 1,932.45	$ 1,918.19	$ 1,922.48	$ 1,921.03	$ 1,925.2	$ 1,923.96
Annual savings in carbon tax for natural gas [$/year]	$ 478.77	$ 479.48	$ 480.21	$ 481.86	$ 482.33	$ 478.77	$ 479.84	$ 479.48	$ 480.52	$ 480.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,396.97	$ 2,400.5	$ 2,404.17	$ 2,412.41	$ 2,414.78	$ 2,396.97	$ 2,402.32	$ 2,400.5	$ 2,405.72	$ 2,404.17
Annual savings in GHG from natural gas savings [kg CO2e/year]	10639.4	10655.1	10671.4	10707.9	10718.5	10639.4	10663.1	10655.1	10678.3	10671.4
Net Present Value [$]	$ 23,840.55	$ 23,843.21	$ 23,784.11	$ 23,773.85	$ 23,636.57	$ 23,201.55	$ 23,298.9	$ 23,204.21	$ 23,298.28	$ 23,145.11
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	14.09	10.47	14.09	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 850.	$ 550.	$.	$.	$ 550.	$ 550.	$ 850.

LARGE 018WWR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 28,395.17	$ 27,795.17	$ 28,945.17	$ 28,895.17	$ 29,245.17	$ 29,034.17	$ 29,074.46	$ 28,345.17	$ 28,295.17	$ 28,311.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 42,649.55	$ 41,748.35	$ 43,475.65	$ 43,400.55	$ 43,926.25	$ 43,609.32	$ 43,669.84	$ 42,574.45	$ 42,499.35	$ 42,524.19
Net Present Value [$]	$ 12,550.65	$ 14,520.2	$ 12,755.02	$ 12,721.82	$ 12,826.16	$ 13,189.65	$ 12,437.7	$ 14,659.65	$ 14,704.57	$ 17,159.66
Incremental dollars per GHG saving	$ 1.52	$ 1.53	$ 1.54	$ 1.54	$ 1.55	$ 1.55	$ 1.55	$ 1.55	$ 1.56	$ 1.56
Auxiliary Energy Required Heating [GJ/yr]	159.1	158.2	159.2	157.9	159.2	159.1	157.3	158.2	157	161.4
Annual Energy DHW [GJ/yr]	16.5	27.6	14.9	16.5	13.9	16.5	16.5	25.8	27.6	27.6
Annual Energy Space Heating [GJ/yr]	100.8	100.9	100.8	100.4	100.8	100.8	99.7	100.9	100.5	103.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	146.2	157.4	144.7	145.7	143.6	146.2	145.1	155.6	157	160.4
Design Heating Load [W]	19710.3	20185.8	19710.3	19659.8	19710.3	19710.3	19536.8	20185.8	20135.4	21140.1
Annual Energy Electricity [kWh/yr]	36034.7	36062.6	36036.8	35907	36038.3	36034.7	35727	36062.6	35939.3	36887.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,035.6	$ 5,039.54	$ 5,035.89	$ 5,017.53	$ 5,036.1	$ 5,035.6	$ 4,992.06	$ 5,039.54	$ 5,022.1	$ 5,156.22
Annual Energy Natural Gas [m3/yr]	442.6	740.8	400.7	442.6	372.9	442.6	442.6	691.8	741	740.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 319.56	$ 172.85	$ 190.92	$ 160.86	$ 190.92	$ 190.92	$ 298.42	$ 319.64	$ 319.56
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	156397	156394	156398	156415	156399	156685	156973	156395	156412	151246
Upgrade Package List	Pkg4321302033	Pkg4321302033	Pkg4321302033	Pkg4321302034	Pkg4321302033	Pkg4321402033	Pkg4331302033	Pkg4321302033	Pkg4321302034	Pkg3331203034
GHGI [kg/m2]	2.43	3.55	2.28	2.43	2.17	2.43	2.43	3.37	3.55	3.57
% ICC	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	86.5	86	86.5	85.9	86.5	86.5	85.5	86	85.3	87.7
Output: MEUI [kWh/(m2 * yr)]	65.4	71.5	64.6	65.2	64	65.4	64.8	70.5	71.3	73.1
Output: Better than ERS (%)	5390.0%	5150.0%	5440.0%	5410.0%	5470.0%	5390.0%	5430.0%	5210.0%	5170.0%	5060.0%
Output: Better than Envelope (%)	2130.0%	2170.0%	2120.0%	2190.0%	2120.0%	2130.0%	2220.0%	2170.0%	2230.0%	2010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26146	26174	26148	26018	26149	26146	25838	26174	26050	26998
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,686.53	$ 3,690.46	$ 3,686.83	$ 3,668.52	$ 3,687.04	$ 3,686.53	$ 3,643.14	$ 3,690.46	$ 3,673.08	$ 3,806.73
Annual savings in carbon tax for electricity [$/year]	$ 13.07	$ 13.09	$ 13.07	$ 13.01	$ 13.07	$ 13.07	$ 12.92	$ 13.09	$ 13.03	$ 13.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,699.6	$ 3,703.55	$ 3,699.9	$ 3,681.53	$ 3,700.11	$ 3,699.6	$ 3,656.06	$ 3,703.55	$ 3,686.1	$ 3,820.23
Annual savings in GHG from electricity savings [kg CO2e/year]	287.6	287.9	287.6	286.2	287.6	287.6	284.2	287.9	286.6	297
Annual savings in natural gas [m3/year]	369.89	358.78	371.45	369.89	372.48	369.89	369.89	360.6	358.77	358.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,427.01	$ 3,324.07	$ 3,441.48	$ 3,427.01	$ 3,451.07	$ 3,427.01	$ 3,427.01	$ 3,340.99	$ 3,324.	$ 3,324.07
Annual savings in carbon tax for natural gas [$/year]	$ 855.37	$ 829.67	$ 858.98	$ 855.37	$ 861.37	$ 855.37	$ 855.37	$ 833.89	$ 829.66	$ 829.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,282.38	$ 4,153.74	$ 4,300.45	$ 4,282.38	$ 4,312.44	$ 4,282.38	$ 4,282.38	$ 4,174.88	$ 4,153.66	$ 4,153.74
Annual savings in GHG from natural gas savings [kg CO2e/year]	19008.1	18437.2	19088.4	19008.1	19141.6	19008.1	19008.1	18531	18436.8	18437.2
Net Present Value [$]	$ 12,550.65	$ 14,520.2	$ 12,755.02	$ 12,721.82	$ 12,826.16	$ 13,189.65	$ 12,437.7	$ 14,659.65	$ 14,704.57	$ 17,159.66
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.	$.

LARGE 018WWR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k	large 018WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 26,474.46	$ 26,424.46	$ 26,595.17	$ 26,774.46	$ 26,974.46	$ 27,274.46	$ 27,076.42	$ 27,126.42	$ 27,255.71	$ 27,426.42
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 39,764.64	$ 39,689.54	$ 39,945.95	$ 40,215.24	$ 40,515.64	$ 40,966.24	$ 40,668.78	$ 40,743.88	$ 40,938.08	$ 41,194.48
Net Present Value [$]	$ 23,843.21	$ 23,840.55	$ 23,784.11	$ 23,773.85	$ 23,636.57	$ 23,567.44	$ 23,298.9	$ 23,298.28	$ 23,287.67	$ 23,229.34
Incremental dollars per GHG saving	$ 2.48	$ 2.48	$ 2.49	$ 2.5	$ 2.51	$ 2.53	$ 2.54	$ 2.54	$ 2.54	$ 2.55
Auxiliary Energy Required Heating [GJ/yr]	157.7	156.5	158.4	157.7	156.5	156.5	156	157.2	155.4	157.3
Annual Energy DHW [GJ/yr]	14.9	16.5	13.9	13.9	14.9	13.9	16.5	14.9	16.5	13.9
Annual Energy Space Heating [GJ/yr]	167	165.7	167.8	167	165.8	165.8	165.3	166.6	164.6	166.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	209.4	209.6	209.1	208.3	208.1	207.1	209.2	208.9	208.5	207.9
Design Heating Load [W]	19448.3	19397.8	19571.3	19448.3	19397.8	19424.2	19474.7	19474.7	19301.2	19474.7
Annual Energy Electricity [kWh/yr]	8450.1	8443.8	8453.8	8450.2	8443.8	8443.9	8441.4	8447.8	8437.8	8447.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,132.37	$ 1,131.48	$ 1,132.9	$ 1,132.39	$ 1,131.48	$ 1,131.5	$ 1,131.14	$ 1,132.05	$ 1,130.63	$ 1,132.06
Annual Energy Natural Gas [m3/yr]	4805.2	4813.4	4796.7	4777.6	4772.1	4744.5	4801	4793.1	4782	4765.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,072.8	$ 2,076.33	$ 2,069.13	$ 2,060.89	$ 2,058.52	$ 2,046.61	$ 2,070.98	$ 2,067.58	$ 2,062.79	$ 2,055.67
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	156965	156982	156408	156966	156983	156984	156550	156533	157108	156534
Upgrade Package List	Pkg4331302033	Pkg4331302034	Pkg4321302034	Pkg4331302033	Pkg4331302034	Pkg4331302034	Pkg4321303034	Pkg4321303033	Pkg4331303033	Pkg4321303033
GHGI [kg/m2]	18.19	18.22	18.16	18.08	18.06	17.96	18.17	18.14	18.1	18.04
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	85.7	85.1	86.1	85.7	85.1	85.1	84.8	85.5	84.5	85.5
Output: MEUI [kWh/(m2 * yr)]	99.9	100	99.7	99.3	99.2	98.6	99.8	99.6	99.4	99.1
Output: Better than ERS (%)	3640.0%	3630.0%	3650.0%	3670.0%	3680.0%	3710.0%	3650.0%	3650.0%	3670.0%	3680.0%
Output: Better than Envelope (%)	2200.0%	2260.0%	2160.0%	2200.0%	2260.0%	2260.0%	2280.0%	2220.0%	2310.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1439	1445	1435	1439	1445	1445	1448	1441	1451	1441
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 202.9	$ 203.79	$ 202.38	$ 202.88	$ 203.79	$ 203.77	$ 204.13	$ 203.22	$ 204.63	$ 203.21
Annual savings in carbon tax for electricity [$/year]	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .72	$ .73	$ .72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 203.62	$ 204.51	$ 203.09	$ 203.6	$ 204.51	$ 204.5	$ 204.85	$ 203.94	$ 205.36	$ 203.93
Annual savings in GHG from electricity savings [kg CO2e/year]	15.8	15.9	15.8	15.8	15.9	15.9	15.9	15.9	16	15.9
Annual savings in natural gas [m3/year]	207.34	207.04	207.66	208.37	208.58	209.6	207.5	207.79	208.21	208.82
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,921.03	$ 1,918.19	$ 1,923.96	$ 1,930.55	$ 1,932.45	$ 1,941.98	$ 1,922.48	$ 1,925.2	$ 1,929.03	$ 1,934.73
Annual savings in carbon tax for natural gas [$/year]	$ 479.48	$ 478.77	$ 480.21	$ 481.86	$ 482.33	$ 484.71	$ 479.84	$ 480.52	$ 481.48	$ 482.9
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,400.5	$ 2,396.97	$ 2,404.17	$ 2,412.41	$ 2,414.78	$ 2,426.69	$ 2,402.32	$ 2,405.72	$ 2,410.51	$ 2,417.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	10655.1	10639.4	10671.4	10707.9	10718.5	10771.3	10663.1	10678.3	10699.5	10731.1
Net Present Value [$]	$ 23,843.21	$ 23,840.55	$ 23,784.11	$ 23,773.85	$ 23,636.57	$ 23,567.44	$ 23,298.9	$ 23,298.28	$ 23,287.67	$ 23,229.34
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2	$ 3,648.2
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26	$ 10,716.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 850.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.

LARGE 023WWR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,223.48	$ 13,273.48	$ 13,523.48	$ 13,684.98	$ 13,734.98	$ 13,814.27	$ 13,823.48	$ 13,902.77	$ 13,952.77	$ 13,984.98
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,223.48	$ 13,273.48	$ 13,523.48	$ 13,684.98	$ 13,734.98	$ 13,814.27	$ 13,823.48	$ 13,902.77	$ 13,952.77	$ 13,984.98
Net Present Value [$]	$ 207.41	$ 1,116.88	$ 323.25	$ 534.28	$ 791.77	$ 740.09	$ 808.67	$ 676.9	$ 644.97	$ 649.87
Incremental dollars per GHG saving	$ 5.3	$ 4.71	$ 5.33	$ 5.42	$ 4.82	$ 5.51	$ 4.81	$ 5.47	$ 4.87	$ 5.45
Auxiliary Energy Required Heating [GJ/yr]	64.6	67.2	64.6	64.1	66.7	63.2	67.2	63.8	66.4	64.1
Annual Energy DHW [GJ/yr]	22.5	13.5	21.6	22.5	13.5	23.7	12.4	22.4	13.5	21.6
Annual Energy Space Heating [GJ/yr]	68.4	71.2	68.4	67.9	70.6	67	71.2	67.5	70.3	67.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	117.6	111.4	116.8	117	110.8	117.4	110.3	116.7	110.5	116.2
Design Heating Load [W]	12861.7	12739.6	12861.7	12761.1	12639.1	12665.6	12739.6	12766.1	12644.1	12761.1
Annual Energy Electricity [kWh/yr]	7769	7782.7	7769	7766.1	7779.8	7761.7	7782.8	7764.6	7778.3	7766.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,036.	$ 1,037.94	$ 1,036.	$ 1,035.59	$ 1,037.53	$ 1,034.97	$ 1,037.95	$ 1,035.38	$ 1,037.31	$ 1,035.59
Annual Energy Natural Gas [m3/yr]	2407.6	2239.3	2385.6	2392.4	2223.9	2402.9	2210.4	2383.9	2215.9	2370.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,038.55	$ 965.96	$ 1,029.06	$ 1,032.	$ 959.31	$ 1,036.53	$ 953.49	$ 1,028.33	$ 955.86	$ 1,022.51
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64154	64156	64155	64424	64426	66043	64157	65774	65776	64425
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2133102031	Pkg2121101031	Pkg2133101031	Pkg2133101031	Pkg2121102031
GHGI [kg/m2]	9.19	8.56	9.11	9.13	8.5	9.17	8.45	9.1	8.47	9.05
% ICC	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	35.1	36.5	35.1	34.8	36.2	34.4	36.5	34.7	36.1	34.8
Output: MEUI [kWh/(m2 * yr)]	50	46.6	49.6	49.7	46.3	49.9	46	49.5	46.2	49.3
Output: Better than ERS (%)	930.0%	1060.0%	990.0%	980.0%	1110.0%	950.0%	1150.0%	1000.0%	1130.0%	1040.0%
Output: Better than Envelope (%)	470.0%	90.0%	470.0%	550.0%	160.0%	680.0%	90.0%	590.0%	210.0%	550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	830	816	830	833	819	837	816	834	820	833
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 116.99	$ 115.06	$ 116.99	$ 117.4	$ 115.46	$ 118.02	$ 115.04	$ 117.61	$ 115.68	$ 117.4
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .42	$ .41	$ .42	$ .41	$ .42	$ .41	$ .42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 117.4	$ 115.46	$ 117.4	$ 117.81	$ 115.87	$ 118.44	$ 115.45	$ 118.03	$ 116.09	$ 117.81
Annual savings in GHG from electricity savings [kg CO2e/year]	9.1	9	9.1	9.2	9	9.2	9	9.2	9	9.2
Annual savings in natural gas [m3/year]	48.4	54.67	49.22	48.96	55.24	48.57	55.74	49.28	55.54	49.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 448.39	$ 506.48	$ 455.98	$ 453.63	$ 511.8	$ 450.01	$ 516.46	$ 456.57	$ 514.56	$ 461.23
Annual savings in carbon tax for natural gas [$/year]	$ 111.91	$ 126.42	$ 113.81	$ 113.22	$ 127.74	$ 112.32	$ 128.91	$ 113.96	$ 128.43	$ 115.12
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 560.3	$ 632.9	$ 569.79	$ 566.86	$ 639.54	$ 562.33	$ 645.37	$ 570.52	$ 642.99	$ 576.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	2487	2809.2	2529.1	2516.1	2838.7	2496	2864.6	2532.4	2854	2558.2
Net Present Value [$]	$ 207.41	$ 1,116.88	$ 323.25	$ 534.28	$ 791.77	$ 740.09	$ 808.67	$ 676.9	$ 644.97	$ 649.87
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 550.	$ 550.	$.	$ 850.

LARGE 023WWR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,423.48	$ 16,973.48	$ 16,884.98	$ 17,273.48	$ 17,102.77	$ 18,997.48	$ 15,823.48	$ 17,434.98	$ 19,236.77	$ 17,734.98
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,423.48	$ 16,973.48	$ 16,884.98	$ 17,273.48	$ 17,102.77	$ 18,997.48	$ 15,823.48	$ 17,434.98	$ 19,236.77	$ 17,734.98
Net Present Value [$]	$ 3,186.24	$ 3,494.75	$ 3,664.72	$ 3,639.89	$ 3,761.09	$ 8,833.35	$ 4,253.79	$ 3,973.23	$ 9,147.5	$ 4,118.37
Incremental dollars per GHG saving	$ 2.59	$ 2.65	$ 2.66	$ 2.69	$ 2.7	$ 2.71	$ 2.72	$ 2.73	$ 2.75	$ 2.76
Auxiliary Energy Required Heating [GJ/yr]	67.1	67.1	66.5	67.1	66.3	66.8	64.5	66.5	67.1	66.6
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	13.5	7.8	23.7	12.4	7.8	11.7
Annual Energy Space Heating [GJ/yr]	23.6	23.6	23.6	23.6	23.5	23.7	22.7	23.6	23.8	23.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1	1.8	1.1
Total Energy [GJ/yr]	65.1	64	65.1	63.3	65	60.2	74.5	64	60.3	63.4
Design Heating Load [W]	12782.7	12782.7	12682.2	12782.7	12687.1	12379.5	12905.5	12682.2	12390.7	12682.2
Annual Energy Electricity [kWh/yr]	14338.3	14339.2	14344.9	14339.8	14297.7	16710.1	14090.9	14345.8	16739.2	14346.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,965.55	$ 1,965.68	$ 1,966.49	$ 1,965.77	$ 1,959.81	$ 2,301.16	$ 1,930.55	$ 1,966.62	$ 2,305.28	$ 1,966.7
Annual Energy Natural Gas [m3/yr]	362.1	333	362.1	314.3	362.1	0	637.2	333	0	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 156.2	$.	$ 274.87	$ 143.64	$.	$ 135.58
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64165	64166	64435	64167	65785	64204	64162	64436	65806	64437
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121101033	Pkg2121101031	Pkg2121102031	Pkg2131101032	Pkg2121102031
GHGI [kg/m2]	1.67	1.56	1.67	1.49	1.66	0.36	2.69	1.56	0.36	1.49
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.7%	1.4%	1.5%	1.7%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	36.5	36.5	36.2	36.5	36	36.3	35.1	36.2	36.5	36.2
Output: MEUI [kWh/(m2 * yr)]	21.4	20.8	21.4	20.4	21.3	18.7	26.4	20.8	18.7	20.4
Output: Better than ERS (%)	4790.0%	4880.0%	4790.0%	4940.0%	4800.0%	5180.0%	4280.0%	4880.0%	5170.0%	4930.0%
Output: Better than Envelope (%)	100.0%	100.0%	190.0%	100.0%	220.0%	150.0%	490.0%	190.0%	100.0%	180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5740	5740	5746	5741	5699	8111	5492	5747	8140	5748
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 809.28	$ 809.41	$ 810.21	$ 809.5	$ 803.56	$ 1,143.71	$ 774.4	$ 810.34	$ 1,147.81	$ 810.43
Annual savings in carbon tax for electricity [$/year]	$ 2.87	$ 2.87	$ 2.87	$ 2.87	$ 2.85	$ 4.06	$ 2.75	$ 2.87	$ 4.07	$ 2.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 812.15	$ 812.28	$ 813.09	$ 812.37	$ 806.41	$ 1,147.76	$ 777.15	$ 813.21	$ 1,151.88	$ 813.3
Annual savings in GHG from electricity savings [kg CO2e/year]	63.1	63.1	63.2	63.2	62.7	89.2	60.4	63.2	89.5	63.2
Annual savings in natural gas [m3/year]	124.61	125.69	124.61	126.39	124.61	138.1	114.36	125.69	138.1	126.39
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,154.5	$ 1,164.55	$ 1,154.5	$ 1,171.	$ 1,154.5	$ 1,279.5	$ 1,059.53	$ 1,164.55	$ 1,279.5	$ 1,171.
Annual savings in carbon tax for natural gas [$/year]	$ 288.16	$ 290.66	$ 288.16	$ 292.28	$ 288.16	$ 319.36	$ 264.45	$ 290.66	$ 319.36	$ 292.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,442.66	$ 1,455.21	$ 1,442.66	$ 1,463.28	$ 1,442.66	$ 1,598.85	$ 1,323.99	$ 1,455.21	$ 1,598.85	$ 1,463.28
Annual savings in GHG from natural gas savings [kg CO2e/year]	6403.5	6459.2	6403.5	6495	6403.5	7096.8	5876.8	6459.2	7096.8	6495
Net Present Value [$]	$ 3,186.24	$ 3,494.75	$ 3,664.72	$ 3,639.89	$ 3,761.09	$ 8,833.35	$ 4,253.79	$ 3,973.23	$ 9,147.5	$ 4,118.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	HRV sre 75	BC ASHP	NA	HRV sre 60	NA
Ventilation System Code	NA	NA	NA	NA	NA	elec heatpump ef1.90	NA	NA	elec heatpump ef1.90	BC ASHP
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NA	NBC HotWater gas	BCGasTankless0.95	NA	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,800.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$.	$.	$ 550.	$.	$ 850.

LARGE 023WWR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 13,273.48	$ 13,823.48	$ 13,734.98	$ 14,123.48	$ 13,952.77	$ 14,284.98	$ 14,584.98	$ 14,502.77	$ 14,414.27	$ 14,802.77
ICC with multiplier (Van=1.0,this Cz =1)	$ 13,273.48	$ 13,823.48	$ 13,734.98	$ 14,123.48	$ 13,952.77	$ 14,284.98	$ 14,584.98	$ 14,502.77	$ 14,414.27	$ 14,802.77
Net Present Value [$]	$ 1,116.88	$ 808.67	$ 791.77	$ 663.72	$ 644.97	$ 482.78	$ 338.55	$ 336.76	$ 319.07	$ 191.57
Incremental dollars per GHG saving	$ 4.71	$ 4.81	$ 4.82	$ 4.86	$ 4.87	$ 4.92	$ 4.96	$ 4.97	$ 4.98	$ 5.01
Auxiliary Energy Required Heating [GJ/yr]	67.2	67.2	66.7	67.2	66.4	66.7	66.7	66.4	65.8	66.4
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	13.5	12.4	11.7	12.4	13.5	11.7
Annual Energy Space Heating [GJ/yr]	71.2	71.2	70.6	71.2	70.3	70.6	70.6	70.3	69.7	70.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	111.4	110.3	110.8	109.6	110.5	109.8	109.1	109.4	109.9	108.8
Design Heating Load [W]	12739.6	12739.6	12639.1	12739.6	12644.1	12639.1	12639.1	12644.1	12543.5	12644.1
Annual Energy Electricity [kWh/yr]	7782.7	7782.8	7779.8	7782.8	7778.3	7779.9	7779.9	7778.4	7775.4	7778.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,037.94	$ 1,037.95	$ 1,037.53	$ 1,037.95	$ 1,037.31	$ 1,037.54	$ 1,037.54	$ 1,037.33	$ 1,036.9	$ 1,037.33
Annual Energy Natural Gas [m3/yr]	2239.3	2210.4	2223.9	2191.9	2215.9	2195.1	2176.5	2187	2200.6	2168.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 965.96	$ 953.49	$ 959.31	$ 945.51	$ 955.86	$ 946.89	$ 938.87	$ 943.4	$ 949.26	$ 935.42
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64156	64157	64426	64158	65776	64427	64428	65777	66046	65778
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2131101031	Pkg2121102031	Pkg2121102031	Pkg2131101031	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	8.56	8.45	8.5	8.38	8.47	8.39	8.32	8.36	8.41	8.29
% ICC	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	36.5	36.5	36.2	36.5	36.1	36.2	36.2	36.1	35.8	36.1
Output: MEUI [kWh/(m2 * yr)]	46.6	46	46.3	45.7	46.2	45.7	45.4	45.6	45.8	45.2
Output: Better than ERS (%)	1060.0%	1150.0%	1110.0%	1200.0%	1130.0%	1190.0%	1240.0%	1220.0%	1180.0%	1270.0%
Output: Better than Envelope (%)	90.0%	90.0%	160.0%	90.0%	210.0%	160.0%	160.0%	210.0%	290.0%	210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	816	816	819	816	820	819	819	820	823	820
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 115.06	$ 115.04	$ 115.46	$ 115.04	$ 115.68	$ 115.45	$ 115.45	$ 115.66	$ 116.09	$ 115.66
Annual savings in carbon tax for electricity [$/year]	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41	$ .41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 115.46	$ 115.45	$ 115.87	$ 115.45	$ 116.09	$ 115.86	$ 115.86	$ 116.07	$ 116.5	$ 116.07
Annual savings in GHG from electricity savings [kg CO2e/year]	9	9	9	9	9	9	9	9	9.1	9
Annual savings in natural gas [m3/year]	54.67	55.74	55.24	56.43	55.54	56.31	57.01	56.61	56.11	57.3
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 506.48	$ 516.46	$ 511.8	$ 522.85	$ 514.56	$ 521.74	$ 528.16	$ 524.54	$ 519.84	$ 530.92
Annual savings in carbon tax for natural gas [$/year]	$ 126.42	$ 128.91	$ 127.74	$ 130.5	$ 128.43	$ 130.22	$ 131.83	$ 130.92	$ 129.75	$ 132.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 632.9	$ 645.37	$ 639.54	$ 653.35	$ 642.99	$ 651.97	$ 659.99	$ 655.46	$ 649.59	$ 663.44
Annual savings in GHG from natural gas savings [kg CO2e/year]	2809.2	2864.6	2838.7	2900	2854	2893.9	2929.5	2909.4	2883.3	2944.8
Net Present Value [$]	$ 1,116.88	$ 808.67	$ 791.77	$ 663.72	$ 644.97	$ 482.78	$ 338.55	$ 336.76	$ 319.07	$ 191.57
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.

LARGE 023WWR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,618.65	$ 22,962.07	$ 23,058.65	$ 23,080.15	$ 23,168.65	$ 23,297.94	$ 23,468.65	$ 23,512.07	$ 23,520.15	$ 23,520.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 22,618.65	$ 22,962.07	$ 23,058.65	$ 23,080.15	$ 23,168.65	$ 23,297.94	$ 23,468.65	$ 23,512.07	$ 23,520.15	$ 23,520.15
Net Present Value [$]	$ 5,465.26	$ 5,845.82	$ 5,632.3	$ 5,792.25	$ 5,773.47	$ 5,942.39	$ 5,918.42	$ 6,154.08	$ 5,959.89	$ 6,310.76
Incremental dollars per GHG saving	$ 6.43	$ 6.54	$ 6.45	$ 6.51	$ 6.48	$ 6.54	$ 6.5	$ 6.59	$ 6.52	$ 6.66
Auxiliary Energy Required Heating [GJ/yr]	54.1	54.2	53	53.5	54.1	53.3	54.1	54.2	52.4	53.9
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	13.5	12.4	13.5	11.7	12.4	13.5	13.5
Annual Energy Space Heating [GJ/yr]	57.3	57.4	56.1	56.7	57.3	56.4	57.3	57.5	55.5	57
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	98.2	98.3	97	97.6	97.1	97.3	96.4	97.3	96.4	97.9
Design Heating Load [W]	10910.8	10997.3	10804	10810.2	10910.8	10815.2	10910.8	10997.3	10703.5	11078.3
Annual Energy Electricity [kWh/yr]	7902.2	7903	7896.4	7899.4	7902.3	7897.9	7902.3	7903.1	7893.5	7901
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,054.85	$ 1,054.96	$ 1,054.03	$ 1,054.45	$ 1,054.86	$ 1,054.24	$ 1,054.86	$ 1,054.97	$ 1,053.62	$ 1,054.68
Annual Energy Natural Gas [m3/yr]	1872.7	1876.9	1841.9	1857.5	1843.8	1849.9	1825.3	1848	1826.8	1866.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 807.82	$ 809.63	$ 794.53	$ 801.26	$ 795.35	$ 797.98	$ 787.37	$ 797.16	$ 788.02	$ 805.1
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96124	90544	96142	96340	96125	98068	96126	90545	96358	80824
Upgrade Package List	Pkg3321201032	Pkg3231202034	Pkg3321201033	Pkg3321202032	Pkg3321201032	Pkg3331201032	Pkg3321201032	Pkg3231202034	Pkg3321202033	Pkg2321202034
GHGI [kg/m2]	7.19	7.2	7.07	7.13	7.08	7.1	7.01	7.09	7.01	7.16
% ICC	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	29.4	29.5	28.8	29.1	29.4	29	29.4	29.5	28.5	29.3
Output: MEUI [kWh/(m2 * yr)]	39.4	39.5	38.8	39.1	38.9	39	38.5	38.9	38.5	39.3
Output: Better than ERS (%)	2120.0%	2110.0%	2220.0%	2170.0%	2210.0%	2190.0%	2260.0%	2190.0%	2260.0%	2140.0%
Output: Better than Envelope (%)	2020.0%	2010.0%	2180.0%	2110.0%	2020.0%	2140.0%	2020.0%	2010.0%	2270.0%	2050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	696	696	702	699	696	701	696	696	705	698
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 98.21	$ 98.09	$ 99.02	$ 98.6	$ 98.19	$ 98.81	$ 98.19	$ 98.08	$ 99.43	$ 98.38
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 98.55	$ 98.44	$ 99.38	$ 98.95	$ 98.54	$ 99.16	$ 98.54	$ 98.43	$ 99.79	$ 98.72
Annual savings in GHG from electricity savings [kg CO2e/year]	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.7
Annual savings in natural gas [m3/year]	68.33	68.17	69.47	68.89	69.4	69.17	70.09	69.25	70.04	68.56
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 633.03	$ 631.59	$ 643.67	$ 638.28	$ 643.01	$ 640.91	$ 649.4	$ 641.56	$ 648.88	$ 635.21
Annual savings in carbon tax for natural gas [$/year]	$ 158.	$ 157.64	$ 160.66	$ 159.31	$ 160.49	$ 159.97	$ 162.09	$ 160.13	$ 161.96	$ 158.55
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 791.04	$ 789.23	$ 804.32	$ 797.59	$ 803.5	$ 800.87	$ 811.48	$ 801.69	$ 810.84	$ 793.76
Annual savings in GHG from natural gas savings [kg CO2e/year]	3511.2	3503.1	3570.1	3540.3	3566.5	3554.8	3601.9	3558.5	3599.1	3523.2
Net Present Value [$]	$ 5,465.26	$ 5,845.82	$ 5,632.3	$ 5,792.25	$ 5,773.47	$ 5,942.39	$ 5,918.42	$ 6,154.08	$ 5,959.89	$ 6,310.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	5.28	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.

LARGE 023WWR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 25,768.65	$ 28,623.44	$ 23,871.28	$ 26,318.65	$ 26,112.07	$ 26,208.65	$ 26,230.15	$ 26,618.65	$ 24,110.57	$ 24,421.28
ICC with multiplier (Van=1.0,this Cz =1)	$ 25,768.65	$ 28,623.44	$ 23,871.28	$ 26,318.65	$ 26,112.07	$ 26,208.65	$ 26,230.15	$ 26,618.65	$ 24,110.57	$ 24,421.28
Net Present Value [$]	$ 9,740.23	$ 15,267.54	$ 10,146.9	$ 10,048.75	$ 10,157.78	$ 9,976.28	$ 10,148.42	$ 10,193.52	$ 10,463.92	$ 10,411.31
Incremental dollars per GHG saving	$ 4.06	$ 4.08	$ 4.1	$ 4.11	$ 4.11	$ 4.13	$ 4.13	$ 4.13	$ 4.14	$ 4.15
Auxiliary Energy Required Heating [GJ/yr]	54	54.2	53.7	54	54.1	52.9	53.4	54	54	53.7
Annual Energy DHW [GJ/yr]	13.5	7.8	23.7	12.4	13.5	13.5	13.5	11.7	23.7	22.5
Annual Energy Space Heating [GJ/yr]	19.1	19.2	19	19.1	19.2	18.8	19	19.1	19.2	19
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	61.2	55.7	71.4	60.1	61.3	60.9	61.1	59.4	71.6	70.2
Design Heating Load [W]	10949.7	10745.1	11376.4	10949.7	11036.3	10843	10849.2	10949.7	11387.5	11376.4
Annual Energy Electricity [kWh/yr]	13254.1	15470.3	13253.4	13255	13282.9	13174.9	13233.4	13255.5	13284.5	13253.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,812.14	$ 2,125.73	$ 1,812.04	$ 1,812.27	$ 1,816.22	$ 1,800.93	$ 1,809.21	$ 1,812.34	$ 1,816.44	$ 1,812.04
Annual Energy Natural Gas [m3/yr]	362.1	0	637.4	333	362.1	362.1	362.1	314.3	637.1	603.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$.	$ 274.95	$ 143.64	$ 156.2	$ 156.2	$ 156.2	$ 135.58	$ 274.82	$ 260.24
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96133	98332	88372	96134	90553	96151	96349	96135	90298	88373
Upgrade Package List	Pkg3321201032	Pkg3331202034	Pkg3221201033	Pkg3321201032	Pkg3231202034	Pkg3321201033	Pkg3321202032	Pkg3321201032	Pkg3231201032	Pkg3221201033
GHGI [kg/m2]	1.64	0.33	2.67	1.53	1.64	1.64	1.64	1.46	2.67	2.55
% ICC	2.3%	2.5%	2.1%	2.3%	2.3%	2.3%	2.3%	2.4%	2.1%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	29.3	29.4	29.2	29.4	29.4	28.7	29.1	29.4	29.4	29.2
Output: MEUI [kWh/(m2 * yr)]	19.2	16.2	24.8	18.6	19.3	19.1	19.2	18.3	24.9	24.1
Output: Better than ERS (%)	5100.0%	5540.0%	4520.0%	5190.0%	5100.0%	5130.0%	5110.0%	5250.0%	4500.0%	4610.0%
Output: Better than Envelope (%)	2040.0%	2010.0%	2080.0%	2040.0%	2020.0%	2200.0%	2120.0%	2040.0%	2040.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4655	6872	4655	4656	4684	4576	4635	4657	4686	4655
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 656.41	$ 968.9	$ 656.31	$ 656.54	$ 660.47	$ 645.24	$ 653.49	$ 656.61	$ 660.7	$ 656.31
Annual savings in carbon tax for electricity [$/year]	$ 2.33	$ 3.44	$ 2.33	$ 2.33	$ 2.34	$ 2.29	$ 2.32	$ 2.33	$ 2.34	$ 2.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 658.74	$ 972.33	$ 658.64	$ 658.87	$ 662.81	$ 647.53	$ 655.81	$ 658.94	$ 663.04	$ 658.64
Annual savings in GHG from electricity savings [kg CO2e/year]	51.2	75.6	51.2	51.2	51.5	50.3	51	51.2	51.5	51.2
Annual savings in natural gas [m3/year]	124.61	138.1	114.35	125.69	124.61	124.61	124.61	126.39	114.36	115.62
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,154.5	$ 1,279.5	$ 1,059.47	$ 1,164.55	$ 1,154.5	$ 1,154.5	$ 1,154.5	$ 1,171.	$ 1,059.57	$ 1,071.24
Annual savings in carbon tax for natural gas [$/year]	$ 288.16	$ 319.36	$ 264.44	$ 290.66	$ 288.16	$ 288.16	$ 288.16	$ 292.28	$ 264.46	$ 267.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,442.66	$ 1,598.85	$ 1,323.9	$ 1,455.21	$ 1,442.66	$ 1,442.66	$ 1,442.66	$ 1,463.28	$ 1,324.03	$ 1,338.61
Annual savings in GHG from natural gas savings [kg CO2e/year]	6403.5	7096.8	5876.4	6459.2	6403.5	6403.5	6403.5	6495	5877	5941.7
Net Present Value [$]	$ 9,740.23	$ 15,267.54	$ 10,146.9	$ 10,048.75	$ 10,157.78	$ 9,976.28	$ 10,148.42	$ 10,193.52	$ 10,463.92	$ 10,411.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	5.28	7.04	5.28	7.04	7.04	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$.	$ 550.

LARGE 023WWR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,618.65	$ 23,058.65	$ 23,168.65	$ 23,080.15	$ 22,962.07	$ 23,468.65	$ 23,608.65	$ 23,297.94	$ 23,558.65	$ 23,520.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 22,618.65	$ 23,058.65	$ 23,168.65	$ 23,080.15	$ 22,962.07	$ 23,468.65	$ 23,608.65	$ 23,297.94	$ 23,558.65	$ 23,520.15
Net Present Value [$]	$ 5,465.26	$ 5,632.3	$ 5,773.47	$ 5,792.25	$ 5,845.82	$ 5,918.42	$ 5,941.29	$ 5,942.39	$ 5,951.43	$ 5,959.89
Incremental dollars per GHG saving	$ 6.43	$ 6.45	$ 6.48	$ 6.51	$ 6.54	$ 6.5	$ 6.5	$ 6.54	$ 6.51	$ 6.52
Auxiliary Energy Required Heating [GJ/yr]	54.1	53	54.1	53.5	54.2	54.1	53	53.3	52.2	52.4
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	13.5	11.7	12.4	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	57.3	56.1	57.3	56.7	57.4	57.3	56.1	56.4	55.3	55.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	98.2	97	97.1	97.6	98.3	96.4	95.9	97.3	96.2	96.4
Design Heating Load [W]	10910.8	10804	10910.8	10810.2	10997.3	10910.8	10804	10815.2	10781.2	10703.5
Annual Energy Electricity [kWh/yr]	7902.2	7896.4	7902.3	7899.4	7903	7902.3	7896.5	7897.9	7892.5	7893.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,054.85	$ 1,054.03	$ 1,054.86	$ 1,054.45	$ 1,054.96	$ 1,054.86	$ 1,054.04	$ 1,054.24	$ 1,053.47	$ 1,053.62
Annual Energy Natural Gas [m3/yr]	1872.7	1841.9	1843.8	1857.5	1876.9	1825.3	1813.1	1849.9	1821.5	1826.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 807.82	$ 794.53	$ 795.35	$ 801.26	$ 809.63	$ 787.37	$ 782.11	$ 797.98	$ 785.73	$ 788.02
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96124	96142	96125	96340	90544	96126	96143	98068	96160	96358
Upgrade Package List	Pkg3321201032	Pkg3321201033	Pkg3321201032	Pkg3321202032	Pkg3231202034	Pkg3321201032	Pkg3321201033	Pkg3331201032	Pkg3321201034	Pkg3321202033
GHGI [kg/m2]	7.19	7.07	7.08	7.13	7.2	7.01	6.96	7.1	7	7.01
% ICC	2.0%	2.0%	2.1%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	29.4	28.8	29.4	29.1	29.5	29.4	28.8	29	28.4	28.5
Output: MEUI [kWh/(m2 * yr)]	39.4	38.8	38.9	39.1	39.5	38.5	38.2	39	38.4	38.5
Output: Better than ERS (%)	2120.0%	2220.0%	2210.0%	2170.0%	2110.0%	2260.0%	2300.0%	2190.0%	2280.0%	2260.0%
Output: Better than Envelope (%)	2020.0%	2180.0%	2020.0%	2110.0%	2010.0%	2020.0%	2180.0%	2140.0%	2300.0%	2270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	696	702	696	699	696	696	702	701	706	705
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 98.21	$ 99.02	$ 98.19	$ 98.6	$ 98.09	$ 98.19	$ 99.01	$ 98.81	$ 99.57	$ 99.43
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 98.55	$ 99.38	$ 98.54	$ 98.95	$ 98.44	$ 98.54	$ 99.36	$ 99.16	$ 99.93	$ 99.79
Annual savings in GHG from electricity savings [kg CO2e/year]	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.8
Annual savings in natural gas [m3/year]	68.33	69.47	69.4	68.89	68.17	70.09	70.55	69.17	70.23	70.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 633.03	$ 643.67	$ 643.01	$ 638.28	$ 631.59	$ 649.4	$ 653.61	$ 640.91	$ 650.71	$ 648.88
Annual savings in carbon tax for natural gas [$/year]	$ 158.	$ 160.66	$ 160.49	$ 159.31	$ 157.64	$ 162.09	$ 163.14	$ 159.97	$ 162.41	$ 161.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 791.04	$ 804.32	$ 803.5	$ 797.59	$ 789.23	$ 811.48	$ 816.75	$ 800.87	$ 813.12	$ 810.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	3511.2	3570.1	3566.5	3540.3	3503.1	3601.9	3625.3	3554.8	3609.2	3599.1
Net Present Value [$]	$ 5,465.26	$ 5,632.3	$ 5,773.47	$ 5,792.25	$ 5,845.82	$ 5,918.42	$ 5,941.29	$ 5,942.39	$ 5,951.43	$ 5,959.89
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	10.47	8.77	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$.

LARGE 023WWR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 15,879.53	$ 16,341.03	$ 16,429.53	$ 16,558.82	$ 16,729.53	$ 15,752.77	$ 16,891.03	$ 17,020.32	$ 17,191.03	$ 17,108.82
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,038.74	$ 17,533.93	$ 17,628.89	$ 17,767.61	$ 17,950.79	$ 16,902.72	$ 18,124.08	$ 18,262.8	$ 18,445.98	$ 18,357.76
Net Present Value [$]	$ 2,315.84	$ 2,014.76	$ 2,007.09	$ 1,868.75	$ 1,862.87	$ 1,780.61	$ 1,705.95	$ 1,568.03	$ 1,561.79	$ 1,560.91
Incremental dollars per GHG saving	$ 4.36	$ 4.45	$ 4.45	$ 4.49	$ 4.48	$ 4.38	$ 4.53	$ 4.57	$ 4.56	$ 4.57
Auxiliary Energy Required Heating [GJ/yr]	79.2	78.5	79.2	78.3	79.2	79.9	78.6	77.6	78.6	78.3
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	13.5	11.7	13.5	12.4	13.5	11.7	12.4
Annual Energy Space Heating [GJ/yr]	83.9	83.2	83.9	82.9	83.9	84.6	83.2	82.2	83.2	82.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	124.1	123.4	123	123.1	122.3	125.5	122.3	122.4	121.7	122
Design Heating Load [W]	15563.1	15434.8	15563.1	15449.2	15563.1	15543.2	15434.8	15320.9	15434.8	15449.2
Annual Energy Electricity [kWh/yr]	7846.3	7842.9	7846.4	7841.4	7846.4	8038.8	7842.9	7837.9	7843	7841.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,046.94	$ 1,046.46	$ 1,046.95	$ 1,046.24	$ 1,046.95	$ 1,074.18	$ 1,046.46	$ 1,045.75	$ 1,046.47	$ 1,046.24
Annual Energy Natural Gas [m3/yr]	2574.1	2556	2545.3	2547.9	2526.7	2594	2527.2	2529.8	2508.6	2519
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,110.38	$ 1,102.57	$ 1,097.95	$ 1,099.08	$ 1,089.93	$ 1,118.96	$ 1,090.15	$ 1,091.27	$ 1,082.12	$ 1,086.61
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70528	70798	70529	73660	70530	65812	70799	73930	70800	73661
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221101031	Pkg2131101033	Pkg2221102031	Pkg2231102031	Pkg2221102031	Pkg2231101031
GHGI [kg/m2]	9.81	9.75	9.71	9.72	9.64	9.89	9.64	9.65	9.57	9.61
% ICC	1.4%	1.4%	1.5%	1.5%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43	42.7	43.1	42.5	43.1	43.4	42.7	42.2	42.7	42.5
Output: MEUI [kWh/(m2 * yr)]	53.5	53.2	53	53	52.6	54.3	52.6	52.6	52.2	52.4
Output: Better than ERS (%)	1500.0%	1550.0%	1580.0%	1570.0%	1620.0%	1400.0%	1620.0%	1620.0%	1660.0%	1640.0%
Output: Better than Envelope (%)	500.0%	590.0%	500.0%	610.0%	500.0%	420.0%	580.0%	700.0%	580.0%	610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	898	901	898	902	898	705	901	906	901	902
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 126.56	$ 127.04	$ 126.55	$ 127.25	$ 126.55	$ 99.42	$ 127.04	$ 127.75	$ 127.03	$ 127.25
Annual savings in carbon tax for electricity [$/year]	$ .45	$ .45	$ .45	$ .45	$ .45	$ .35	$ .45	$ .45	$ .45	$ .45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 127.01	$ 127.49	$ 127.	$ 127.7	$ 127.	$ 99.77	$ 127.49	$ 128.2	$ 127.48	$ 127.7
Annual savings in GHG from electricity savings [kg CO2e/year]	9.9	9.9	9.9	9.9	9.9	7.8	9.9	10	9.9	9.9
Annual savings in natural gas [m3/year]	70.66	71.33	71.73	71.63	72.42	69.92	72.41	72.31	73.1	72.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 654.64	$ 660.89	$ 664.59	$ 663.69	$ 671.01	$ 647.78	$ 670.83	$ 669.94	$ 677.26	$ 673.67
Annual savings in carbon tax for natural gas [$/year]	$ 163.4	$ 164.96	$ 165.88	$ 165.65	$ 167.48	$ 161.68	$ 167.44	$ 167.21	$ 169.04	$ 168.14
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 818.04	$ 825.85	$ 830.46	$ 829.34	$ 838.49	$ 809.46	$ 838.27	$ 837.15	$ 846.3	$ 841.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	3631	3665.7	3686.2	3681.2	3721.8	3592.9	3720.8	3715.8	3756.4	3736.5
Net Present Value [$]	$ 2,315.84	$ 2,014.76	$ 2,007.09	$ 1,868.75	$ 1,862.87	$ 1,780.61	$ 1,705.95	$ 1,568.03	$ 1,561.79	$ 1,560.91
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 5,610.26	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 75	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,800.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.	$ 850.	$ 550.

LARGE 023WWR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75
Total increase in construction cost [$]	$ 14,033.48	$ 14,473.48	$ 14,494.98	$ 14,583.48	$ 14,712.77	$ 14,883.48	$ 14,934.98	$ 15,023.48	$ 15,044.98	$ 15,152.77
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 15,057.92	$ 15,530.04	$ 15,553.11	$ 15,648.07	$ 15,786.8	$ 15,969.97	$ 16,025.23	$ 16,120.19	$ 16,143.26	$ 16,258.92
Net Present Value [$]	$ 1,186.87	$ 1,068.62	$ 885.79	$ 923.44	$ 743.54	$ 806.88	$ 767.54	$ 805.18	$ 622.36	$ 623.95
Incremental dollars per GHG saving	$ 4.57	$ 4.61	$ 4.67	$ 4.65	$ 4.71	$ 4.68	$ 4.7	$ 4.68	$ 4.74	$ 4.75
Auxiliary Energy Required Heating [GJ/yr]	80	78.7	79.4	80	79.1	80	78.1	78.7	79.4	77.8
Annual Energy DHW [GJ/yr]	23.6	23.6	23.6	22.3	23.6	21.5	23.6	22.3	22.3	23.6
Annual Energy Space Heating [GJ/yr]	84.8	83.4	84.1	84.8	83.8	84.8	82.7	83.4	84.1	82.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	135.8	134.4	135.1	134.5	134.8	133.7	133.8	133.2	133.9	133.4
Design Heating Load [W]	15985.4	15849.3	15857.2	15985.4	15871.5	15985.4	15721	15849.3	15857.2	15735.4
Annual Energy Electricity [kWh/yr]	8039.5	8032.6	8036.1	8039.5	8034.5	8039.5	8029.2	8032.6	8036.1	8027.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,074.27	$ 1,073.3	$ 1,073.79	$ 1,074.27	$ 1,073.57	$ 1,074.27	$ 1,072.82	$ 1,073.3	$ 1,073.79	$ 1,072.6
Annual Energy Natural Gas [m3/yr]	2869.9	2833.6	2851.8	2835.7	2843.3	2813.8	2815.5	2799.4	2817.6	2807.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,237.97	$ 1,222.32	$ 1,230.17	$ 1,223.22	$ 1,226.5	$ 1,213.78	$ 1,214.51	$ 1,207.56	$ 1,215.41	$ 1,210.89
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64171	64189	64441	64172	65791	64173	64459	64190	64442	65809
Upgrade Package List	Pkg2121101032	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2131101032	Pkg2121101032	Pkg2121102033	Pkg2121101033	Pkg2121102032	Pkg2131101033
GHGI [kg/m2]	10.93	10.79	10.86	10.8	10.83	10.72	10.72	10.66	10.73	10.69
% ICC	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.5	42.8	43.2	43.5	43	43.5	42.5	42.8	43.2	42.3
Output: MEUI [kWh/(m2 * yr)]	59.9	59.2	59.5	59.2	59.4	58.8	58.8	58.5	58.8	58.6
Output: Better than ERS (%)	1040.0%	1130.0%	1090.0%	1130.0%	1110.0%	1180.0%	1170.0%	1210.0%	1170.0%	1200.0%
Output: Better than Envelope (%)	410.0%	560.0%	480.0%	410.0%	520.0%	410.0%	640.0%	560.0%	480.0%	670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	704	711	708	704	709	704	715	711	708	716
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 99.32	$ 100.29	$ 99.8	$ 99.32	$ 100.03	$ 99.32	$ 100.77	$ 100.29	$ 99.8	$ 100.98
Annual savings in carbon tax for electricity [$/year]	$ .35	$ .36	$ .35	$ .35	$ .35	$ .35	$ .36	$ .36	$ .35	$ .36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 99.67	$ 100.65	$ 100.15	$ 99.67	$ 100.38	$ 99.67	$ 101.13	$ 100.65	$ 100.15	$ 101.34
Annual savings in GHG from electricity savings [kg CO2e/year]	7.7	7.8	7.8	7.7	7.8	7.7	7.9	7.8	7.8	7.9
Annual savings in natural gas [m3/year]	59.64	60.99	60.31	60.91	60.63	61.73	61.66	62.26	61.59	61.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 552.53	$ 565.06	$ 558.78	$ 564.34	$ 561.72	$ 571.9	$ 571.31	$ 576.87	$ 570.59	$ 574.21
Annual savings in carbon tax for natural gas [$/year]	$ 137.91	$ 141.04	$ 139.47	$ 140.86	$ 140.2	$ 142.74	$ 142.6	$ 143.98	$ 142.42	$ 143.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 690.44	$ 706.1	$ 698.25	$ 705.2	$ 701.92	$ 714.64	$ 713.91	$ 720.85	$ 713.	$ 717.53
Annual savings in GHG from natural gas savings [kg CO2e/year]	3064.7	3134.2	3099.3	3130.1	3115.6	3172.1	3168.8	3199.6	3164.8	3184.9
Net Present Value [$]	$ 1,186.87	$ 1,068.62	$ 885.79	$ 923.44	$ 743.54	$ 806.88	$ 767.54	$ 805.18	$ 622.36	$ 623.95
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$.

LARGE 023WWR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 17,183.48	$ 18,684.98	$ 17,733.48	$ 17,623.48	$ 18,902.77	$ 17,644.98	$ 19,029.53	$ 18,033.48	$ 19,234.98	$ 17,862.77
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,437.87	$ 20,048.98	$ 19,028.02	$ 18,909.99	$ 20,282.67	$ 18,933.06	$ 20,418.69	$ 19,349.92	$ 20,639.13	$ 19,166.75
Net Present Value [$]	$ 10,737.	$ 10,541.92	$ 11,001.41	$ 11,327.08	$ 10,402.57	$ 11,161.31	$ 9,479.29	$ 11,117.24	$ 10,849.89	$ 11,169.26
Incremental dollars per GHG saving	$ 2.38	$ 2.41	$ 2.43	$ 2.44	$ 2.44	$ 2.44	$ 2.45	$ 2.46	$ 2.46	$ 2.47
Auxiliary Energy Required Heating [GJ/yr]	79.9	80	79.9	78.6	79.7	79.2	79	79.9	80	79
Annual Energy DHW [GJ/yr]	23.7	13.5	22.4	23.7	13.5	23.7	13.5	21.6	12.4	23.6
Annual Energy Space Heating [GJ/yr]	33.1	33.9	33.1	33.3	33.4	33	32.7	33.1	33.9	32.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	91	81.7	89.8	91.3	81.2	91	79.7	88.9	80.6	90.7
Design Heating Load [W]	16043.1	15585.8	16043.1	15907	15600.1	15914.9	15620	16043.1	15585.8	15929.2
Annual Energy Electricity [kWh/yr]	18718.8	18948	18718.8	18777.1	18809.3	18704	18401.4	18718.8	18949	18623.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,585.4	$ 2,617.83	$ 2,585.4	$ 2,593.64	$ 2,598.2	$ 2,583.3	$ 2,540.48	$ 2,585.4	$ 2,617.97	$ 2,571.9
Annual Energy Natural Gas [m3/yr]	635.1	362.1	601	635.1	362.1	635.2	362.1	579	332.9	634.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 273.96	$ 156.2	$ 259.25	$ 273.96	$ 156.2	$ 274.	$ 156.2	$ 249.76	$ 143.6	$ 273.87
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	64180	64471	64181	64198	65821	64450	70537	64182	64472	65800
Upgrade Package List	Pkg2121101032	Pkg2121102033	Pkg2121101032	Pkg2121101033	Pkg2131101033	Pkg2121102032	Pkg2221101031	Pkg2121101032	Pkg2121102033	Pkg2131101032
GHGI [kg/m2]	2.78	1.76	2.65	2.78	1.76	2.78	1.75	2.57	1.66	2.78
% ICC	1.5%	1.7%	1.6%	1.6%	1.7%	1.6%	1.7%	1.6%	1.7%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.4	43.5	43.4	42.7	43.3	43.1	42.9	43.4	43.5	42.9
Output: MEUI [kWh/(m2 * yr)]	34.9	29.8	34.2	35	29.6	34.9	28.8	33.8	29.2	34.7
Output: Better than ERS (%)	4180.0%	4570.0%	4250.0%	4160.0%	4600.0%	4180.0%	4700.0%	4310.0%	4640.0%	4200.0%
Output: Better than Envelope (%)	420.0%	410.0%	420.0%	580.0%	440.0%	500.0%	530.0%	420.0%	410.0%	530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9975	10204	9975	10033	10065	9960	9658	9975	10205	9880
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,406.46	$ 1,438.78	$ 1,406.46	$ 1,414.68	$ 1,419.22	$ 1,404.37	$ 1,361.71	$ 1,406.46	$ 1,438.92	$ 1,393.01
Annual savings in carbon tax for electricity [$/year]	$ 4.99	$ 5.1	$ 4.99	$ 5.02	$ 5.03	$ 4.98	$ 4.83	$ 4.99	$ 5.1	$ 4.94
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,411.45	$ 1,443.88	$ 1,411.45	$ 1,419.7	$ 1,424.25	$ 1,409.35	$ 1,366.54	$ 1,411.45	$ 1,444.02	$ 1,397.95
Annual savings in GHG from electricity savings [kg CO2e/year]	109.7	112.2	109.7	110.4	110.7	109.6	106.2	109.7	112.3	108.7
Annual savings in natural gas [m3/year]	142.9	153.07	144.17	142.9	153.07	142.9	153.07	144.99	154.16	142.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,324.	$ 1,418.24	$ 1,335.77	$ 1,324.	$ 1,418.24	$ 1,323.96	$ 1,418.24	$ 1,343.36	$ 1,428.32	$ 1,324.06
Annual savings in carbon tax for natural gas [$/year]	$ 330.46	$ 353.98	$ 333.4	$ 330.46	$ 353.98	$ 330.45	$ 353.98	$ 335.3	$ 356.5	$ 330.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,654.46	$ 1,772.22	$ 1,669.17	$ 1,654.46	$ 1,772.22	$ 1,654.41	$ 1,772.22	$ 1,678.66	$ 1,784.82	$ 1,654.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	7343.6	7866.3	7408.9	7343.6	7866.3	7343.4	7866.3	7451	7922.2	7344
Net Present Value [$]	$ 10,737.	$ 10,541.92	$ 11,001.41	$ 11,327.08	$ 10,402.57	$ 11,161.31	$ 9,479.29	$ 11,117.24	$ 10,849.89	$ 11,169.26
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 8,216.31	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	NA	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$.	$.	$ 850.	$ 550.	$.

LARGE 023WWR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,020.15	$ 24,187.94	$ 24,199.44	$ 24,237.94	$ 24,270.15	$ 24,449.44	$ 24,487.94	$ 24,570.15	$ 24,649.44	$ 24,699.44
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,773.62	$ 25,953.66	$ 25,966.	$ 26,007.31	$ 26,041.87	$ 26,234.25	$ 26,275.56	$ 26,363.77	$ 26,448.85	$ 26,502.5
Net Present Value [$]	$ 3,149.84	$ 4,732.28	$ 3,312.39	$ 3,298.47	$ 4,700.94	$ 4,861.06	$ 4,848.11	$ 3,457.86	$ 5,036.03	$ 3,601.25
Incremental dollars per GHG saving	$ 5.56	$ 6.06	$ 5.59	$ 5.59	$ 6.04	$ 6.08	$ 6.07	$ 5.61	$ 6.12	$ 5.65
Auxiliary Energy Required Heating [GJ/yr]	66.4	64.1	66.4	66.1	64.4	64.3	64.1	66.4	63.5	65.5
Annual Energy DHW [GJ/yr]	13.5	22.3	13.5	13.5	21.5	21.5	21.5	12.4	22.3	13.5
Annual Energy Space Heating [GJ/yr]	70.4	67.9	70.3	70.1	68.2	68.1	67.9	70.4	67.2	69.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	111.3	117.6	111.2	111	117.1	117	116.8	110.2	117	110.3
Design Heating Load [W]	13583.9	13787.4	13499.2	13598.2	13773	13688.3	13787.4	13583.9	13659.1	13470
Annual Energy Electricity [kWh/yr]	7967.5	7955.2	7967.2	7966.1	7956.6	7956.3	7955.2	7967.6	7951.8	7962.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,064.09	$ 1,062.35	$ 1,064.04	$ 1,063.89	$ 1,062.54	$ 1,062.5	$ 1,062.35	$ 1,064.1	$ 1,061.86	$ 1,063.41
Annual Energy Natural Gas [m3/yr]	2217.5	2390.2	2215.6	2209.7	2376.2	2374	2368.2	2188.6	2372.4	2191.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 956.55	$ 1,031.05	$ 955.73	$ 953.19	$ 1,025.01	$ 1,024.06	$ 1,021.56	$ 944.09	$ 1,023.37	$ 945.47
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96376	98102	98302	98104	96375	98301	98103	96377	98318	98320
Upgrade Package List	Pkg3321202034	Pkg3331201034	Pkg3331202033	Pkg3331201034	Pkg3321202034	Pkg3331202033	Pkg3331201034	Pkg3321202034	Pkg3331202034	Pkg3331202034
GHGI [kg/m2]	8.48	9.13	8.47	8.45	9.07	9.07	9.04	8.37	9.06	8.38
% ICC	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	36.1	34.8	36.1	36	35	35	34.8	36.1	34.5	35.6
Output: MEUI [kWh/(m2 * yr)]	46.6	50	46.5	46.4	49.7	49.7	49.6	46	49.7	46
Output: Better than ERS (%)	2380.0%	2240.0%	2380.0%	2400.0%	2280.0%	2280.0%	2300.0%	2450.0%	2280.0%	2450.0%
Output: Better than Envelope (%)	2040.0%	2310.0%	2040.0%	2070.0%	2280.0%	2290.0%	2310.0%	2040.0%	2390.0%	2150.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	776	789	777	778	787	788	789	776	792	781
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 109.47	$ 111.21	$ 109.51	$ 109.67	$ 111.01	$ 111.05	$ 111.21	$ 109.46	$ 111.69	$ 110.15
Annual savings in carbon tax for electricity [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .4	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 109.86	$ 111.6	$ 109.9	$ 110.06	$ 111.4	$ 111.45	$ 111.6	$ 109.85	$ 112.08	$ 110.54
Annual savings in GHG from electricity savings [kg CO2e/year]	8.5	8.7	8.5	8.6	8.7	8.7	8.7	8.5	8.7	8.6
Annual savings in natural gas [m3/year]	83.94	77.51	84.02	84.23	78.03	78.11	78.33	85.02	78.17	84.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 777.74	$ 718.13	$ 778.4	$ 780.44	$ 722.96	$ 723.72	$ 725.72	$ 787.72	$ 724.27	$ 786.62
Annual savings in carbon tax for natural gas [$/year]	$ 194.12	$ 179.24	$ 194.29	$ 194.79	$ 180.45	$ 180.64	$ 181.14	$ 196.61	$ 180.77	$ 196.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 971.87	$ 897.37	$ 972.69	$ 975.23	$ 903.41	$ 904.36	$ 906.86	$ 984.33	$ 905.05	$ 982.95
Annual savings in GHG from natural gas savings [kg CO2e/year]	4313.8	3983.1	4317.4	4328.7	4009.9	4014.2	4025.3	4369.1	4017.2	4363
Net Present Value [$]	$ 3,149.84	$ 4,732.28	$ 3,312.39	$ 3,298.47	$ 4,700.94	$ 4,861.06	$ 4,848.11	$ 3,457.86	$ 5,036.03	$ 3,601.25
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	10.47	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$ 850.	$ 850.	$ 550.	$ 550.	$.

LARGE 023WWR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,170.15	$ 27,349.44	$ 27,387.94	$ 25,608.65	$ 25,630.15	$ 27,720.15	$ 28,020.15	$ 27,899.44	$ 25,847.94	$ 27,937.94
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 29,153.57	$ 29,345.95	$ 29,387.26	$ 27,478.08	$ 27,501.15	$ 29,743.72	$ 30,065.62	$ 29,936.1	$ 27,734.84	$ 29,977.41
Net Present Value [$]	$ 14,354.37	$ 14,853.73	$ 14,700.89	$ 15,084.74	$ 15,148.05	$ 14,662.16	$ 14,807.11	$ 15,161.52	$ 15,415.45	$ 15,008.67
Incremental dollars per GHG saving	$ 3.5	$ 3.52	$ 3.52	$ 3.53	$ 3.54	$ 3.54	$ 3.56	$ 3.56	$ 3.57	$ 3.57
Auxiliary Energy Required Heating [GJ/yr]	66.3	66.2	66	65.7	66.4	66.3	66.3	66.2	66.1	66
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	23.7	23.7	12.4	11.7	12.4	23.6	12.4
Annual Energy Space Heating [GJ/yr]	27.5	28	27.4	27.2	27.6	27.5	27.5	28	27.3	27.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	75.2	75.6	75.3	85.3	85.4	74.1	73.4	74.5	85.5	74.3
Design Heating Load [W]	13636.4	13551.7	13650.8	13984.7	13992.6	13636.4	13636.4	13551.7	14007	13650.8
Annual Energy Electricity [kWh/yr]	17133	17257.3	17183	17134.3	17150.6	17133.9	17134.5	17258.2	17170.8	17183.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,361.	$ 2,378.59	$ 2,368.08	$ 2,361.19	$ 2,363.49	$ 2,361.13	$ 2,361.22	$ 2,378.72	$ 2,366.35	$ 2,368.21
Annual Energy Natural Gas [m3/yr]	362.1	362.1	362.1	635.3	635.3	332.9	314.2	332.9	635	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 156.2	$ 274.05	$ 274.05	$ 143.6	$ 135.53	$ 143.6	$ 273.92	$ 143.6
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96385	98311	98113	96148	96346	96386	96387	98312	98074	98114
Upgrade Package List	Pkg3321202034	Pkg3331202033	Pkg3331201034	Pkg3321201033	Pkg3321202032	Pkg3321202034	Pkg3321202034	Pkg3331202033	Pkg3331201032	Pkg3331201034
GHGI [kg/m2]	1.73	1.73	1.73	2.75	2.75	1.62	1.55	1.62	2.75	1.62
% ICC	2.4%	2.4%	2.4%	2.3%	2.3%	2.5%	2.5%	2.5%	2.3%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	36	36	35.9	35.7	36.1	36	36	36	35.9	35.9
Output: MEUI [kWh/(m2 * yr)]	26.3	26.5	26.4	31.8	31.9	25.7	25.3	25.9	31.9	25.8
Output: Better than ERS (%)	5000.0%	4980.0%	5000.0%	4540.0%	4540.0%	5080.0%	5120.0%	5050.0%	4530.0%	5060.0%
Output: Better than Envelope (%)	2050.0%	2060.0%	2090.0%	2120.0%	2040.0%	2050.0%	2050.0%	2060.0%	2070.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8389	8513	8439	8390	8407	8390	8391	8514	8427	8440
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,182.86	$ 1,200.39	$ 1,189.91	$ 1,183.05	$ 1,185.34	$ 1,182.99	$ 1,183.07	$ 1,200.52	$ 1,188.19	$ 1,190.04
Annual savings in carbon tax for electricity [$/year]	$ 4.19	$ 4.26	$ 4.22	$ 4.2	$ 4.2	$ 4.2	$ 4.2	$ 4.26	$ 4.21	$ 4.22
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,187.06	$ 1,204.65	$ 1,194.13	$ 1,187.24	$ 1,189.55	$ 1,187.18	$ 1,187.27	$ 1,204.77	$ 1,192.41	$ 1,194.26
Annual savings in GHG from electricity savings [kg CO2e/year]	92.3	93.6	92.8	92.3	92.5	92.3	92.3	93.7	92.7	92.8
Annual savings in natural gas [m3/year]	153.07	153.07	153.07	142.9	142.9	154.16	154.86	154.16	142.91	154.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,418.24	$ 1,418.24	$ 1,418.24	$ 1,323.93	$ 1,323.93	$ 1,428.32	$ 1,434.77	$ 1,428.32	$ 1,324.03	$ 1,428.32
Annual savings in carbon tax for natural gas [$/year]	$ 353.98	$ 353.98	$ 353.98	$ 330.45	$ 330.45	$ 356.5	$ 358.11	$ 356.5	$ 330.47	$ 356.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,772.22	$ 1,772.22	$ 1,772.22	$ 1,654.37	$ 1,654.37	$ 1,784.82	$ 1,792.88	$ 1,784.82	$ 1,654.5	$ 1,784.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	7866.3	7866.3	7866.3	7343.2	7343.2	7922.2	7958	7922.2	7343.8	7922.2
Net Present Value [$]	$ 14,354.37	$ 14,853.73	$ 14,700.89	$ 15,084.74	$ 15,148.05	$ 14,662.16	$ 14,807.11	$ 15,161.52	$ 15,415.45	$ 15,008.67
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	8.77	10.47	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$ 850.	$ 550.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 550.

LARGE 023WWR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 24,020.15	$ 24,237.94	$ 24,199.44	$ 24,570.15	$ 24,699.44	$ 24,870.15	$ 24,787.94	$ 24,749.44	$ 25,087.94	$ 25,049.44
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,773.62	$ 26,007.31	$ 25,966.	$ 26,363.77	$ 26,502.5	$ 26,685.67	$ 26,597.46	$ 26,556.15	$ 26,919.36	$ 26,878.05
Net Present Value [$]	$ 3,149.84	$ 3,298.47	$ 3,312.39	$ 3,457.86	$ 3,601.25	$ 3,602.09	$ 3,606.55	$ 3,621.2	$ 3,751.5	$ 3,765.6
Incremental dollars per GHG saving	$ 5.56	$ 5.59	$ 5.59	$ 5.61	$ 5.65	$ 5.64	$ 5.64	$ 5.65	$ 5.67	$ 5.67
Auxiliary Energy Required Heating [GJ/yr]	66.4	66.1	66.4	66.4	65.5	66.4	66.2	66.4	66.2	66.4
Annual Energy DHW [GJ/yr]	13.5	13.5	13.5	12.4	13.5	11.7	12.4	12.4	11.7	11.7
Annual Energy Space Heating [GJ/yr]	70.4	70.1	70.3	70.4	69.4	70.4	70.1	70.3	70.1	70.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	111.3	111	111.2	110.2	110.3	109.5	109.9	110.1	109.2	109.4
Design Heating Load [W]	13583.9	13598.2	13499.2	13583.9	13470	13583.9	13598.2	13499.2	13598.2	13499.2
Annual Energy Electricity [kWh/yr]	7967.5	7966.1	7967.2	7967.6	7962.7	7967.6	7966.1	7967.2	7966.1	7967.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,064.09	$ 1,063.89	$ 1,064.04	$ 1,064.1	$ 1,063.41	$ 1,064.1	$ 1,063.89	$ 1,064.04	$ 1,063.89	$ 1,064.06
Annual Energy Natural Gas [m3/yr]	2217.5	2209.7	2215.6	2188.6	2191.8	2170	2180.8	2186.8	2162.3	2168.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 956.55	$ 953.19	$ 955.73	$ 944.09	$ 945.47	$ 936.06	$ 940.72	$ 943.31	$ 932.74	$ 935.29
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96376	98104	98302	96377	98320	96378	98105	98303	98106	98304
Upgrade Package List	Pkg3321202034	Pkg3331201034	Pkg3331202033	Pkg3321202034	Pkg3331202034	Pkg3321202034	Pkg3331201034	Pkg3331202033	Pkg3331201034	Pkg3331202033
GHGI [kg/m2]	8.48	8.45	8.47	8.37	8.38	8.3	8.34	8.37	8.27	8.3
% ICC	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	36.1	36	36.1	36.1	35.6	36.1	36	36.1	36	36.1
Output: MEUI [kWh/(m2 * yr)]	46.6	46.4	46.5	46	46	45.6	45.8	45.9	45.4	45.6
Output: Better than ERS (%)	2380.0%	2400.0%	2380.0%	2450.0%	2450.0%	2500.0%	2470.0%	2460.0%	2520.0%	2510.0%
Output: Better than Envelope (%)	2040.0%	2070.0%	2040.0%	2040.0%	2150.0%	2040.0%	2060.0%	2040.0%	2060.0%	2040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	776	778	777	776	781	776	778	777	778	777
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 109.47	$ 109.67	$ 109.51	$ 109.46	$ 110.15	$ 109.46	$ 109.67	$ 109.51	$ 109.67	$ 109.5
Annual savings in carbon tax for electricity [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 109.86	$ 110.06	$ 109.9	$ 109.85	$ 110.54	$ 109.85	$ 110.06	$ 109.9	$ 110.06	$ 109.89
Annual savings in GHG from electricity savings [kg CO2e/year]	8.5	8.6	8.5	8.5	8.6	8.5	8.6	8.5	8.6	8.5
Annual savings in natural gas [m3/year]	83.94	84.23	84.02	85.02	84.9	85.71	85.31	85.09	86	85.78
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 777.74	$ 780.44	$ 778.4	$ 787.72	$ 786.62	$ 794.14	$ 790.41	$ 788.34	$ 796.8	$ 794.76
Annual savings in carbon tax for natural gas [$/year]	$ 194.12	$ 194.79	$ 194.29	$ 196.61	$ 196.34	$ 198.21	$ 197.28	$ 196.77	$ 198.88	$ 198.37
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 971.87	$ 975.23	$ 972.69	$ 984.33	$ 982.95	$ 992.36	$ 987.7	$ 985.11	$ 995.68	$ 993.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	4313.8	4328.7	4317.4	4369.1	4363	4404.8	4384.1	4372.6	4419.5	4408.2
Net Present Value [$]	$ 3,149.84	$ 3,298.47	$ 3,312.39	$ 3,457.86	$ 3,601.25	$ 3,602.09	$ 3,606.55	$ 3,621.2	$ 3,751.5	$ 3,765.6
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	10.47	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE 023WWR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,291.03	$ 16,420.32	$ 16,508.82	$ 16,591.03	$ 16,639.53	$ 16,808.82	$ 16,970.32	$ 17,079.53	$ 17,101.03	$ 17,189.53
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,343.7	$ 18,489.28	$ 18,588.93	$ 18,681.5	$ 18,736.11	$ 18,926.73	$ 19,108.58	$ 19,231.55	$ 19,255.76	$ 19,355.41
Net Present Value [$]	$ 6,638.27	$ 6,481.01	$ 6,506.88	$ 6,544.28	$ 6,216.07	$ 6,412.89	$ 6,248.39	$ 6,202.48	$ 5,958.55	$ 5,983.7
Incremental dollars per GHG saving	$ 3.51	$ 3.55	$ 3.55	$ 3.54	$ 3.53	$ 3.57	$ 3.61	$ 3.55	$ 3.59	$ 3.59
Auxiliary Energy Required Heating [GJ/yr]	106.6	105.4	106.3	106.6	103.7	106.3	105.4	101.9	102.8	103.7
Annual Energy DHW [GJ/yr]	23.3	24.7	23.2	22.3	24.7	22.3	23.3	24.7	24.7	23.3
Annual Energy Space Heating [GJ/yr]	112.9	111.7	112.5	112.9	109.8	112.5	111.7	108	108.9	109.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.8	1.1	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	162.9	163.1	162.5	162	161.9	161.6	161.7	160.1	161	160.5
Design Heating Load [W]	20500.6	20367.2	20533.6	20500.6	19973	20533.6	20367.2	19796.4	19806.6	19973
Annual Energy Electricity [kWh/yr]	7992.8	7986.7	7991.1	7992.8	8164.5	7991.1	7986.7	8155.4	8160.1	8164.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,067.67	$ 1,066.8	$ 1,067.43	$ 1,067.67	$ 1,091.96	$ 1,067.43	$ 1,066.8	$ 1,090.67	$ 1,091.34	$ 1,091.96
Annual Energy Natural Gas [m3/yr]	3602	3607.2	3592.2	3577.4	3558	3567.6	3569.3	3509.9	3535	3520.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,553.78	$ 1,556.02	$ 1,549.55	$ 1,543.17	$ 1,534.8	$ 1,538.94	$ 1,539.67	$ 1,514.05	$ 1,524.88	$ 1,518.45
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70796	73927	73658	70797	70543	73659	73928	70561	70813	70544
Upgrade Package List	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2221102031	Pkg2221101032	Pkg2231101031	Pkg2231102031	Pkg2221101033	Pkg2221102032	Pkg2221101032
GHGI [kg/m2]	13.67	13.69	13.63	13.58	13.51	13.54	13.55	13.33	13.42	13.37
% ICC	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.9	57.3	57.8	57.9	56.3	57.8	57.3	55.4	55.9	56.3
Output: MEUI [kWh/(m2 * yr)]	74.6	74.7	74.4	74.1	74.1	73.9	74	73.1	73.6	73.3
Output: Better than ERS (%)	1650.0%	1640.0%	1670.0%	1690.0%	1700.0%	1710.0%	1710.0%	1790.0%	1740.0%	1770.0%
Output: Better than Envelope (%)	240.0%	350.0%	270.0%	240.0%	500.0%	270.0%	350.0%	670.0%	590.0%	500.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1044	1050	1046	1044	872	1046	1050	882	877	872
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 147.22	$ 148.08	$ 147.46	$ 147.22	$ 123.01	$ 147.46	$ 148.08	$ 124.29	$ 123.63	$ 123.01
Annual savings in carbon tax for electricity [$/year]	$ .52	$ .53	$ .52	$ .52	$ .44	$ .52	$ .53	$ .44	$ .44	$ .44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 147.74	$ 148.6	$ 147.98	$ 147.74	$ 123.44	$ 147.98	$ 148.6	$ 124.73	$ 124.07	$ 123.44
Annual savings in GHG from electricity savings [kg CO2e/year]	11.5	11.6	11.5	11.5	9.6	11.5	11.6	9.7	9.6	9.6
Annual savings in natural gas [m3/year]	90.04	89.84	90.4	90.95	91.68	91.32	91.25	93.47	92.53	93.09
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 834.19	$ 832.39	$ 837.57	$ 842.68	$ 849.37	$ 846.06	$ 845.47	$ 865.98	$ 857.31	$ 862.46
Annual savings in carbon tax for natural gas [$/year]	$ 208.21	$ 207.76	$ 209.05	$ 210.33	$ 212.	$ 211.17	$ 211.03	$ 216.14	$ 213.98	$ 215.27
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,042.39	$ 1,040.15	$ 1,046.62	$ 1,053.01	$ 1,061.37	$ 1,057.23	$ 1,056.5	$ 1,082.12	$ 1,071.3	$ 1,077.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	4626.9	4616.9	4645.6	4674	4711.1	4692.7	4689.5	4803.2	4755.1	4783.7
Net Present Value [$]	$ 6,638.27	$ 6,481.01	$ 6,506.88	$ 6,544.28	$ 6,216.07	$ 6,412.89	$ 6,248.39	$ 6,202.48	$ 5,958.55	$ 5,983.7
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,360.	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.	$ 550.	$.	$.	$ 550.

LARGE 023WWR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,891.03	$ 19,108.82	$ 19,441.03	$ 20,389.53	$ 19,741.03	$ 19,658.82	$ 19,570.32	$ 19,958.82	$ 20,939.53	$ 20,829.53
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 21,271.3	$ 21,516.53	$ 21,890.6	$ 22,958.61	$ 22,228.4	$ 22,135.83	$ 22,036.18	$ 22,473.63	$ 23,577.91	$ 23,454.05
Net Present Value [$]	$ 3,347.14	$ 3,452.04	$ 3,579.76	$ 2,628.96	$ 3,673.51	$ 3,684.41	$ 3,707.58	$ 3,777.68	$ 2,911.34	$ 2,609.95
Incremental dollars per GHG saving	$ 1.87	$ 1.89	$ 1.91	$ 1.91	$ 1.93	$ 1.93	$ 1.93	$ 1.95	$ 1.95	$ 1.95
Auxiliary Energy Required Heating [GJ/yr]	106.3	106	106.3	105.4	106.3	106	105.2	106	105.4	103.7
Annual Energy DHW [GJ/yr]	24.7	24.7	23.3	14.3	22.4	23.3	24.7	22.4	13	14.3
Annual Energy Space Heating [GJ/yr]	42.5	42.4	42.5	42	42.5	42.4	42.1	42.4	42	41.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.8	1.1	1.1	1.1	1.1	1.8	1.8
Total Energy [GJ/yr]	98.2	98.1	96.8	88	95.9	96.6	97.8	95.7	86.8	87.3
Design Heating Load [W]	20577.1	20610.1	20577.1	19759	20577.1	20610.1	20443.7	20610.1	19759	19582.4
Annual Energy Electricity [kWh/yr]	20422.5	20379.6	20422.5	20474.8	20422.5	20379.6	20299.6	20379.6	20475.9	20296.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,826.47	$ 2,820.4	$ 2,826.47	$ 2,833.87	$ 2,826.47	$ 2,820.4	$ 2,809.08	$ 2,820.4	$ 2,834.02	$ 2,808.64
Annual Energy Natural Gas [m3/yr]	663.4	663.1	625.5	382.7	600.9	625.2	663.1	600.5	350.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.17	$ 286.04	$ 269.82	$ 165.08	$ 259.21	$ 269.69	$ 286.04	$ 259.03	$ 151.15	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70804	73666	70805	70555	70806	73667	73936	73668	70556	70573
Upgrade Package List	Pkg2222102031	Pkg2231101031	Pkg2222102031	Pkg2221101032	Pkg2221102031	Pkg2231101031	Pkg2231102031	Pkg2231101031	Pkg2221101032	Pkg2221101033
GHGI [kg/m2]	2.93	2.92	2.78	1.87	2.69	2.78	2.92	2.69	1.75	1.87
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.7%	1.7%	1.8%	1.9%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.8	57.6	57.8	57.3	57.8	57.6	57.2	57.6	57.3	56.4
Output: MEUI [kWh/(m2 * yr)]	39.1	39	38.3	33.5	37.8	38.2	38.8	37.7	32.8	33.1
Output: Better than ERS (%)	4940.0%	4950.0%	5010.0%	5320.0%	5060.0%	5020.0%	4960.0%	5070.0%	5390.0%	5360.0%
Output: Better than Envelope (%)	270.0%	290.0%	270.0%	350.0%	270.0%	290.0%	370.0%	290.0%	350.0%	500.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11386	11343	11386	11438	11386	11343	11263	11343	11439	11260
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,605.37	$ 1,599.32	$ 1,605.37	$ 1,612.74	$ 1,605.37	$ 1,599.32	$ 1,588.04	$ 1,599.32	$ 1,612.9	$ 1,587.6
Annual savings in carbon tax for electricity [$/year]	$ 5.69	$ 5.67	$ 5.69	$ 5.72	$ 5.69	$ 5.67	$ 5.63	$ 5.67	$ 5.72	$ 5.63
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,611.06	$ 1,604.99	$ 1,611.06	$ 1,618.46	$ 1,611.06	$ 1,604.99	$ 1,593.67	$ 1,604.99	$ 1,618.62	$ 1,593.23
Annual savings in GHG from electricity savings [kg CO2e/year]	125.2	124.8	125.2	125.8	125.2	124.8	123.9	124.8	125.8	123.9
Annual savings in natural gas [m3/year]	199.53	199.54	200.94	209.98	201.85	200.95	199.54	201.87	211.19	209.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,848.6	$ 1,848.7	$ 1,861.68	$ 1,945.5	$ 1,870.18	$ 1,861.79	$ 1,848.7	$ 1,870.31	$ 1,956.65	$ 1,945.5
Annual savings in carbon tax for natural gas [$/year]	$ 461.4	$ 461.43	$ 464.67	$ 485.59	$ 466.79	$ 464.69	$ 461.43	$ 466.82	$ 488.37	$ 485.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,310.	$ 2,310.13	$ 2,326.35	$ 2,431.09	$ 2,336.96	$ 2,326.48	$ 2,310.13	$ 2,337.14	$ 2,445.02	$ 2,431.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	10253.4	10254	10325.9	10790.8	10373	10326.5	10254	10373.8	10852.7	10790.8
Net Present Value [$]	$ 3,347.14	$ 3,452.04	$ 3,579.76	$ 2,628.96	$ 3,673.51	$ 3,684.41	$ 3,707.58	$ 3,777.68	$ 2,911.34	$ 2,609.95
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 60	NA	NA	NA	NA	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,360.	$.	$.	$.	$.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.

LARGE 023WWR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 17,239.53	$ 17,679.53	$ 17,701.03	$ 18,141.03	$ 17,789.53	$ 18,229.53	$ 17,918.82	$ 18,358.82	$ 18,089.53	$ 18,529.53
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 19,411.71	$ 19,907.15	$ 19,931.36	$ 20,426.8	$ 20,031.01	$ 20,526.45	$ 20,176.59	$ 20,672.03	$ 20,368.81	$ 20,864.25
Net Present Value [$]	$ 7,448.14	$ 7,437.15	$ 7,189.89	$ 7,178.91	$ 7,166.26	$ 7,155.09	$ 7,053.64	$ 7,041.69	$ 7,040.12	$ 7,029.31
Incremental dollars per GHG saving	$ 3.35	$ 3.38	$ 3.41	$ 3.43	$ 3.42	$ 3.44	$ 3.44	$ 3.46	$ 3.45	$ 3.47
Auxiliary Energy Required Heating [GJ/yr]	105.7	104	104.9	103.2	105.7	104	104.6	102.8	105.7	104
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	13	13	14.3	14.3	12.3	12.3
Annual Energy Space Heating [GJ/yr]	112	110.2	111.1	109.3	112	110.2	110.8	108.9	112	110.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	153.7	151.8	152.8	151	152.5	150.6	152.4	150.6	151.7	149.9
Design Heating Load [W]	19683.4	19506.8	19517	19340.4	19683.4	19506.8	19550	19373.4	19683.4	19506.8
Annual Energy Electricity [kWh/yr]	8175.5	8166.3	8171.1	8161.9	8175.5	8166.4	8169.4	8160.2	8175.6	8166.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,093.52	$ 1,092.22	$ 1,092.9	$ 1,091.59	$ 1,093.52	$ 1,092.23	$ 1,092.66	$ 1,091.35	$ 1,093.53	$ 1,092.23
Annual Energy Natural Gas [m3/yr]	3335.9	3287.5	3313	3264.6	3303.9	3255.5	3303.8	3255.5	3283.1	3234.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,438.99	$ 1,418.11	$ 1,429.11	$ 1,408.23	$ 1,425.19	$ 1,404.31	$ 1,425.14	$ 1,404.31	$ 1,416.21	$ 1,395.34
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70546	70564	70816	70834	70547	70565	73678	73696	70548	70566
Upgrade Package List	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2221101032	Pkg2221101033	Pkg2231101032	Pkg2231101033	Pkg2221101032	Pkg2221101033
GHGI [kg/m2]	12.68	12.49	12.59	12.41	12.56	12.37	12.56	12.37	12.48	12.3
% ICC	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.5	56.5	57	56.1	57.5	56.5	56.8	55.9	57.5	56.5
Output: MEUI [kWh/(m2 * yr)]	69.6	68.6	69.1	68.1	69	68	68.9	67.9	68.5	67.5
Output: Better than ERS (%)	1880.0%	1980.0%	1930.0%	2020.0%	1940.0%	2040.0%	1950.0%	2040.0%	1990.0%	2080.0%
Output: Better than Envelope (%)	320.0%	480.0%	390.0%	550.0%	320.0%	480.0%	420.0%	590.0%	320.0%	480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	861	871	866	875	861	870	868	877	861	870
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 121.46	$ 122.75	$ 122.08	$ 123.37	$ 121.46	$ 122.74	$ 122.32	$ 123.61	$ 121.44	$ 122.74
Annual savings in carbon tax for electricity [$/year]	$ .43	$ .44	$ .43	$ .44	$ .43	$ .44	$ .43	$ .44	$ .43	$ .44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 121.89	$ 123.19	$ 122.51	$ 123.81	$ 121.89	$ 123.18	$ 122.75	$ 124.05	$ 121.87	$ 123.18
Annual savings in GHG from electricity savings [kg CO2e/year]	9.5	9.6	9.5	9.6	9.5	9.6	9.5	9.6	9.5	9.6
Annual savings in natural gas [m3/year]	99.95	101.75	100.8	102.61	101.14	102.95	101.15	102.95	101.92	103.72
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 926.04	$ 942.75	$ 933.95	$ 950.66	$ 937.09	$ 953.8	$ 937.13	$ 953.8	$ 944.27	$ 960.98
Annual savings in carbon tax for natural gas [$/year]	$ 231.14	$ 235.31	$ 233.11	$ 237.28	$ 233.89	$ 238.06	$ 233.9	$ 238.06	$ 235.69	$ 239.86
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,157.18	$ 1,178.06	$ 1,167.06	$ 1,187.94	$ 1,170.98	$ 1,191.86	$ 1,171.03	$ 1,191.86	$ 1,179.96	$ 1,200.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	5136.4	5229	5180.2	5272.9	5197.6	5290.3	5197.8	5290.3	5237.5	5330.1
Net Present Value [$]	$ 7,448.14	$ 7,437.15	$ 7,189.89	$ 7,178.91	$ 7,166.26	$ 7,155.09	$ 7,053.64	$ 7,041.69	$ 7,040.12	$ 7,029.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	10.47	8.77	8.77	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

LARGE 023WWR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 28,064.15	$ 28,564.15	$ 28,614.15	$ 28,703.15	$ 28,743.44	$ 28,914.15	$ 29,114.15	$ 29,203.15	$ 29,243.44	$ 29,253.15
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,600.23	$ 32,163.23	$ 32,219.53	$ 32,319.75	$ 32,365.11	$ 32,557.33	$ 32,782.53	$ 32,882.75	$ 32,928.11	$ 32,939.05
Net Present Value [$]	$ 7,698.79	$ 7,911.58	$ 7,931.17	$ 8,337.79	$ 8,062.1	$ 8,025.16	$ 8,144.2	$ 8,550.58	$ 8,292.11	$ 8,570.17
Incremental dollars per GHG saving	$ 2.77	$ 2.81	$ 2.8	$ 2.83	$ 2.83	$ 2.82	$ 2.85	$ 2.88	$ 2.88	$ 2.86
Auxiliary Energy Required Heating [GJ/yr]	87.4	86.3	87.4	87.4	86.3	87.4	86.3	86.3	85.2	87.4
Annual Energy DHW [GJ/yr]	24.7	24.7	23.3	24.7	24.7	22.4	23.3	24.7	24.7	23.3
Annual Energy Space Heating [GJ/yr]	35.1	34.7	35.1	35.1	34.7	35.1	34.7	34.7	34.3	35.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	91.5	91.1	90.1	91.5	91	89.2	89.7	91.1	90.7	90.1
Design Heating Load [W]	17276.4	17238.5	17276.4	17276.4	17143	17276.4	17238.5	17238.5	17105.1	17276.4
Annual Energy Electricity [kWh/yr]	18549	18437.2	18549	18549	18427.3	18549	18437.2	18437.2	18322.1	18549
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,561.37	$ 2,545.55	$ 2,561.37	$ 2,561.37	$ 2,544.15	$ 2,561.37	$ 2,545.55	$ 2,545.55	$ 2,529.26	$ 2,561.37
Annual Energy Natural Gas [m3/yr]	663.6	663.7	625.7	663.6	663.3	601.1	625.8	663.7	663.4	625.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.25	$ 286.3	$ 269.91	$ 286.25	$ 286.12	$ 259.29	$ 269.95	$ 286.3	$ 286.17	$ 269.91
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	103690	103708	103691	103978	104266	103692	103709	103996	104284	103979
Upgrade Package List	Pkg4321302033	Pkg4321302034	Pkg4321302033	Pkg4321402033	Pkg4331302033	Pkg4321302033	Pkg4321302034	Pkg4321402034	Pkg4331302034	Pkg4321402033
GHGI [kg/m2]	2.89	2.88	2.74	2.89	2.88	2.65	2.74	2.88	2.88	2.74
% ICC	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	47.5	46.9	47.5	47.5	46.9	47.5	46.9	46.9	46.3	47.5
Output: MEUI [kWh/(m2 * yr)]	35.4	35.2	34.6	35.4	35.2	34.1	34.4	35.2	35	34.6
Output: Better than ERS (%)	5290.0%	5310.0%	5360.0%	5290.0%	5310.0%	5400.0%	5380.0%	5310.0%	5330.0%	5360.0%
Output: Better than Envelope (%)	2000.0%	2100.0%	2000.0%	2000.0%	2100.0%	2000.0%	2100.0%	2100.0%	2200.0%	2000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9512	9400	9512	9512	9390	9512	9400	9400	9285	9512
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,341.21	$ 1,325.44	$ 1,341.21	$ 1,341.21	$ 1,324.05	$ 1,341.21	$ 1,325.44	$ 1,325.44	$ 1,309.21	$ 1,341.21
Annual savings in carbon tax for electricity [$/year]	$ 4.76	$ 4.7	$ 4.76	$ 4.76	$ 4.7	$ 4.76	$ 4.7	$ 4.7	$ 4.64	$ 4.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,345.96	$ 1,330.14	$ 1,345.96	$ 1,345.96	$ 1,328.74	$ 1,345.96	$ 1,330.14	$ 1,330.14	$ 1,313.86	$ 1,345.96
Annual savings in GHG from electricity savings [kg CO2e/year]	104.6	103.4	104.6	104.6	103.3	104.6	103.4	103.4	102.1	104.6
Annual savings in natural gas [m3/year]	199.52	199.51	200.93	199.52	199.53	201.85	200.93	199.51	199.53	200.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,848.53	$ 1,848.5	$ 1,861.62	$ 1,848.53	$ 1,848.64	$ 1,870.11	$ 1,861.58	$ 1,848.5	$ 1,848.6	$ 1,861.62
Annual savings in carbon tax for natural gas [$/year]	$ 461.38	$ 461.38	$ 464.65	$ 461.38	$ 461.41	$ 466.77	$ 464.64	$ 461.38	$ 461.4	$ 464.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,309.92	$ 2,309.87	$ 2,326.27	$ 2,309.92	$ 2,310.05	$ 2,336.88	$ 2,326.22	$ 2,309.87	$ 2,310.	$ 2,326.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	10253	10252.8	10325.6	10253	10253.6	10372.7	10325.4	10252.8	10253.4	10325.6
Net Present Value [$]	$ 7,698.79	$ 7,911.58	$ 7,931.17	$ 8,337.79	$ 8,062.1	$ 8,025.16	$ 8,144.2	$ 8,550.58	$ 8,292.11	$ 8,570.17
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,774.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.	$.	$ 550.

LARGE 023WWR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 28,064.15	$ 29,843.44	$ 28,614.15	$ 28,564.15	$ 28,914.15	$ 30,393.44	$ 28,703.15	$ 28,743.44	$ 30,693.44	$ 29,114.15
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,600.23	$ 33,603.71	$ 32,219.53	$ 32,163.23	$ 32,557.33	$ 34,223.01	$ 32,319.75	$ 32,365.11	$ 34,560.81	$ 32,782.53
Net Present Value [$]	$ 7,698.79	$ 6,993.32	$ 7,931.17	$ 7,911.58	$ 8,025.16	$ 7,275.51	$ 8,337.79	$ 8,062.1	$ 7,401.41	$ 8,144.2
Incremental dollars per GHG saving	$ 2.77	$ 2.79	$ 2.8	$ 2.81	$ 2.82	$ 2.83	$ 2.83	$ 2.83	$ 2.85	$ 2.85
Auxiliary Energy Required Heating [GJ/yr]	87.4	87.3	87.4	86.3	87.4	87.3	87.4	86.3	87.3	86.3
Annual Energy DHW [GJ/yr]	24.7	14.3	23.3	24.7	22.4	13	24.7	24.7	12.3	23.3
Annual Energy Space Heating [GJ/yr]	35.1	35	35.1	34.7	35.1	35	35.1	34.7	35	34.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	91.5	80.8	90.1	91.1	89.2	79.6	91.5	91	78.9	89.7
Design Heating Load [W]	17276.4	16827.8	17276.4	17238.5	17276.4	16827.8	17276.4	17143	16827.8	17238.5
Annual Energy Electricity [kWh/yr]	18549	18497.8	18549	18437.2	18549	18498.9	18549	18427.3	18499.6	18437.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,561.37	$ 2,554.12	$ 2,561.37	$ 2,545.55	$ 2,561.37	$ 2,554.28	$ 2,561.37	$ 2,544.15	$ 2,554.38	$ 2,545.55
Annual Energy Natural Gas [m3/yr]	663.6	382.7	625.7	663.7	601.1	350.4	663.6	663.3	329.4	625.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.25	$ 165.08	$ 269.91	$ 286.3	$ 259.29	$ 151.15	$ 286.25	$ 286.12	$ 142.09	$ 269.95
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	103690	104287	103691	103708	103692	104288	103978	104266	104289	103709
Upgrade Package List	Pkg4321302033	Pkg4331302034	Pkg4321302033	Pkg4321302034	Pkg4321302033	Pkg4331302034	Pkg4321402033	Pkg4331302033	Pkg4331302034	Pkg4321302034
GHGI [kg/m2]	2.89	1.83	2.74	2.88	2.65	1.71	2.89	2.88	1.63	2.74
% ICC	2.5%	2.6%	2.5%	2.5%	2.6%	2.7%	2.5%	2.5%	2.7%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	47.5	47.4	47.5	46.9	47.5	47.4	47.5	46.9	47.5	46.9
Output: MEUI [kWh/(m2 * yr)]	35.4	29.6	34.6	35.2	34.1	29	35.4	35.2	28.5	34.4
Output: Better than ERS (%)	5290.0%	5710.0%	5360.0%	5310.0%	5400.0%	5770.0%	5290.0%	5310.0%	5810.0%	5380.0%
Output: Better than Envelope (%)	2000.0%	2010.0%	2000.0%	2100.0%	2000.0%	2010.0%	2000.0%	2100.0%	2010.0%	2100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9512	9461	9512	9400	9512	9462	9512	9390	9463	9400
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,341.21	$ 1,333.99	$ 1,341.21	$ 1,325.44	$ 1,341.21	$ 1,334.14	$ 1,341.21	$ 1,324.05	$ 1,334.24	$ 1,325.44
Annual savings in carbon tax for electricity [$/year]	$ 4.76	$ 4.73	$ 4.76	$ 4.7	$ 4.76	$ 4.73	$ 4.76	$ 4.7	$ 4.73	$ 4.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,345.96	$ 1,338.72	$ 1,345.96	$ 1,330.14	$ 1,345.96	$ 1,338.87	$ 1,345.96	$ 1,328.74	$ 1,338.97	$ 1,330.14
Annual savings in GHG from electricity savings [kg CO2e/year]	104.6	104.1	104.6	103.4	104.6	104.1	104.6	103.3	104.1	103.4
Annual savings in natural gas [m3/year]	199.52	209.98	200.93	199.51	201.85	211.19	199.52	199.53	211.97	200.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,848.53	$ 1,945.5	$ 1,861.62	$ 1,848.5	$ 1,870.11	$ 1,956.65	$ 1,848.53	$ 1,848.64	$ 1,963.9	$ 1,861.58
Annual savings in carbon tax for natural gas [$/year]	$ 461.38	$ 485.59	$ 464.65	$ 461.38	$ 466.77	$ 488.37	$ 461.38	$ 461.41	$ 490.18	$ 464.64
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,309.92	$ 2,431.09	$ 2,326.27	$ 2,309.87	$ 2,336.88	$ 2,445.02	$ 2,309.92	$ 2,310.05	$ 2,454.08	$ 2,326.22
Annual savings in GHG from natural gas savings [kg CO2e/year]	10253	10790.8	10325.6	10252.8	10372.7	10852.7	10253	10253.6	10892.9	10325.4
Net Present Value [$]	$ 7,698.79	$ 6,993.32	$ 7,931.17	$ 7,911.58	$ 8,025.16	$ 7,275.51	$ 8,337.79	$ 8,062.1	$ 7,401.41	$ 8,144.2
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$.	$ 850.	$ 550.

LARGE 023WWR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 29,843.44	$ 30,393.44	$ 30,693.44	$ 30,482.44	$ 30,495.4	$ 28,064.15	$ 30,674.69	$ 28,564.15	$ 31,032.44	$ 28,614.15
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 33,603.71	$ 34,223.01	$ 34,560.81	$ 34,323.23	$ 34,337.82	$ 31,600.23	$ 34,539.7	$ 32,163.23	$ 34,942.53	$ 32,219.53
Net Present Value [$]	$ 6,993.32	$ 7,275.51	$ 7,401.41	$ 7,632.32	$ 7,659.88	$ 7,698.79	$ 7,800.28	$ 7,911.58	$ 7,914.51	$ 7,931.17
Incremental dollars per GHG saving	$ 2.79	$ 2.83	$ 2.85	$ 2.85	$ 2.85	$ 2.77	$ 2.87	$ 2.81	$ 2.89	$ 2.8
Auxiliary Energy Required Heating [GJ/yr]	87.3	87.3	87.3	87.3	87.2	87.4	87.2	86.3	87.3	87.4
Annual Energy DHW [GJ/yr]	14.3	13	12.3	14.3	14.3	24.7	14.3	24.7	13	23.3
Annual Energy Space Heating [GJ/yr]	35	35	35	35	35	35.1	34.9	34.7	35	35.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	80.8	79.6	78.9	80.8	80.9	91.5	80.8	91.1	79.6	90.1
Design Heating Load [W]	16827.8	16827.8	16827.8	16827.8	16860.7	17276.4	16765.2	17238.5	16827.8	17276.4
Annual Energy Electricity [kWh/yr]	18497.8	18498.9	18499.6	18497.8	18503.5	18549	18488.4	18437.2	18498.9	18549
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,554.12	$ 2,554.28	$ 2,554.38	$ 2,554.12	$ 2,554.93	$ 2,561.37	$ 2,552.79	$ 2,545.55	$ 2,554.28	$ 2,561.37
Annual Energy Natural Gas [m3/yr]	382.7	350.4	329.4	382.7	382.7	663.6	382.7	663.7	350.4	625.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 151.15	$ 142.09	$ 165.08	$ 165.08	$ 286.25	$ 165.08	$ 286.3	$ 151.15	$ 269.91
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	104287	104288	104289	104575	103855	103690	104413	103708	104576	103691
Upgrade Package List	Pkg4331302034	Pkg4331302034	Pkg4331302034	Pkg4331402034	Pkg4321303034	Pkg4321302033	Pkg4331303033	Pkg4321302034	Pkg4331402034	Pkg4321302033
GHGI [kg/m2]	1.83	1.71	1.63	1.83	1.83	2.89	1.83	2.88	1.71	2.74
% ICC	2.6%	2.7%	2.7%	2.7%	2.7%	2.5%	2.7%	2.5%	2.8%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	47.4	47.4	47.5	47.4	47.4	47.5	47.4	46.9	47.4	47.5
Output: MEUI [kWh/(m2 * yr)]	29.6	29	28.5	29.6	29.6	35.4	29.6	35.2	29	34.6
Output: Better than ERS (%)	5710.0%	5770.0%	5810.0%	5710.0%	5700.0%	5290.0%	5710.0%	5310.0%	5770.0%	5360.0%
Output: Better than Envelope (%)	2010.0%	2010.0%	2010.0%	2010.0%	2010.0%	2000.0%	2010.0%	2100.0%	2010.0%	2000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	9461	9462	9463	9461	9467	9512	9452	9400	9462	9512
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,333.99	$ 1,334.14	$ 1,334.24	$ 1,333.99	$ 1,334.79	$ 1,341.21	$ 1,332.66	$ 1,325.44	$ 1,334.14	$ 1,341.21
Annual savings in carbon tax for electricity [$/year]	$ 4.73	$ 4.73	$ 4.73	$ 4.73	$ 4.73	$ 4.76	$ 4.73	$ 4.7	$ 4.73	$ 4.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,338.72	$ 1,338.87	$ 1,338.97	$ 1,338.72	$ 1,339.52	$ 1,345.96	$ 1,337.39	$ 1,330.14	$ 1,338.87	$ 1,345.96
Annual savings in GHG from electricity savings [kg CO2e/year]	104.1	104.1	104.1	104.1	104.1	104.6	104	103.4	104.1	104.6
Annual savings in natural gas [m3/year]	209.98	211.19	211.97	209.98	209.98	199.52	209.98	199.51	211.19	200.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,945.5	$ 1,956.65	$ 1,963.9	$ 1,945.5	$ 1,945.5	$ 1,848.53	$ 1,945.5	$ 1,848.5	$ 1,956.65	$ 1,861.62
Annual savings in carbon tax for natural gas [$/year]	$ 485.59	$ 488.37	$ 490.18	$ 485.59	$ 485.59	$ 461.38	$ 485.59	$ 461.38	$ 488.37	$ 464.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,431.09	$ 2,445.02	$ 2,454.08	$ 2,431.09	$ 2,431.09	$ 2,309.92	$ 2,431.09	$ 2,309.87	$ 2,445.02	$ 2,326.27
Annual savings in GHG from natural gas savings [kg CO2e/year]	10790.8	10852.7	10892.9	10790.8	10790.8	10253	10790.8	10252.8	10852.7	10325.6
Net Present Value [$]	$ 6,993.32	$ 7,275.51	$ 7,401.41	$ 7,632.32	$ 7,659.88	$ 7,698.79	$ 7,800.28	$ 7,911.58	$ 7,914.51	$ 7,931.17
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	14.09	10.47	14.09	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$.	$ 550.	$ 550.

LARGE 023WWR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,729.53	$ 16,891.03	$ 16,964.27	$ 17,020.32	$ 17,108.82	$ 17,183.48	$ 17,191.03	$ 17,239.53	$ 17,332.82	$ 17,408.82
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,127.75	$ 25,370.33	$ 25,480.33	$ 25,564.52	$ 25,697.45	$ 25,809.59	$ 25,820.93	$ 25,893.77	$ 26,033.9	$ 26,148.05
Net Present Value [$]	$ 14,552.15	$ 14,450.39	$ 7,651.8	$ 14,362.05	$ 14,323.73	$ 7,732.23	$ 14,362.82	$ 14,152.42	$ 9,334.74	$ 14,236.1
Incremental dollars per GHG saving	$ 2.59	$ 2.61	$ 1.25	$ 2.62	$ 2.63	$ 1.26	$ 2.63	$ 2.62	$ 2.52	$ 2.66
Auxiliary Energy Required Heating [GJ/yr]	150.8	149.7	156	148.2	149.3	154	149.7	146.3	155.3	149.3
Annual Energy DHW [GJ/yr]	13.4	14.3	26.7	15.8	14.3	26.7	13.4	15.8	9.1	13.4
Annual Energy Space Heating [GJ/yr]	159.7	158.6	77	157	158.2	76.2	158.6	155	164.5	158.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	199.9	199.7	132.2	199.6	199.3	132	198.7	198.2	200.4	198.3
Design Heating Load [W]	24847.8	24650.2	26174.6	24494.3	24691.9	25704	24650.2	24023.7	25101.1	24691.9
Annual Energy Electricity [kWh/yr]	8231.1	8225.2	29306.4	8217.4	8223.3	29250.8	8225.3	8389.7	10784.4	8223.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,101.39	$ 1,100.55	$ 4,083.54	$ 1,099.45	$ 1,100.28	$ 4,075.67	$ 1,100.56	$ 1,123.83	$ 1,462.68	$ 1,100.3
Annual Energy Natural Gas [m3/yr]	4572	4566.7	717.3	4564.2	4556.4	717.8	4541.3	4510.1	4338.1	4531
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,972.2	$ 1,969.92	$ 309.42	$ 1,968.84	$ 1,965.47	$ 309.63	$ 1,958.96	$ 1,945.5	$ 1,871.31	$ 1,954.52
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	175938	176207	171460	179338	179069	169588	176208	175954	179071	179070
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2131102031	Pkg2231102031	Pkg2231101031	Pkg2121101032	Pkg2221102031	Pkg2221101032	Pkg2231101031	Pkg2231101031
GHGI [kg/m2]	17.31	17.29	3.32	17.28	17.25	3.32	17.19	17.08	16.49	17.15
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	82	81.4	84.8	80.6	81.2	83.7	81.4	79.5	84.4	81.2
Output: MEUI [kWh/(m2 * yr)]	94.7	94.6	57.8	94.5	94.4	57.7	94.1	93.8	95	93.9
Output: Better than ERS (%)	1870.0%	1880.0%	4620.0%	1890.0%	1900.0%	4630.0%	1920.0%	1940.0%	1890.0%	1940.0%
Output: Better than Envelope (%)	930.0%	990.0%	610.0%	1080.0%	1020.0%	730.0%	990.0%	1200.0%	660.0%	1020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1174	1180	19901	1188	1182	19845	1180	1016	1379	1182
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 165.6	$ 166.44	$ 2,806.01	$ 167.54	$ 166.7	$ 2,798.17	$ 166.42	$ 143.24	$ 194.41	$ 166.69
Annual savings in carbon tax for electricity [$/year]	$ .59	$ .59	$ 9.95	$ .59	$ .59	$ 9.92	$ .59	$ .51	$ .69	$ .59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 166.19	$ 167.03	$ 2,815.96	$ 168.13	$ 167.3	$ 2,808.1	$ 167.01	$ 143.75	$ 195.1	$ 167.28
Annual savings in GHG from electricity savings [kg CO2e/year]	12.9	13	218.9	13.1	13	218.3	13	11.2	15.2	13
Annual savings in natural gas [m3/year]	125.7	125.89	269.32	125.99	126.28	269.3	126.84	128	134.41	127.22
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,164.58	$ 1,166.41	$ 2,495.24	$ 1,167.27	$ 1,169.97	$ 2,495.06	$ 1,175.18	$ 1,185.95	$ 1,245.32	$ 1,178.73
Annual savings in carbon tax for natural gas [$/year]	$ 290.67	$ 291.13	$ 622.8	$ 291.35	$ 292.02	$ 622.76	$ 293.32	$ 296.01	$ 310.83	$ 294.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,455.25	$ 1,457.54	$ 3,118.04	$ 1,458.62	$ 1,461.98	$ 3,117.82	$ 1,468.5	$ 1,481.95	$ 1,556.15	$ 1,472.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	6459.4	6469.6	13840	6474.3	6489.3	13839	6518.2	6577.9	6907.3	6537.9
Net Present Value [$]	$ 14,552.15	$ 14,450.39	$ 7,651.8	$ 14,362.05	$ 14,323.73	$ 7,732.23	$ 14,362.82	$ 14,152.42	$ 9,334.74	$ 14,236.1
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	10.47	8.77	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	5.28	5.28	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 5,610.26	$ 8,216.31	$ 8,216.31	$ 5,610.26	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 60	NA	HRV sre 60	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$ 3,150.	$.	$.	$ 3,150.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,360.	$.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$ 850.

LARGE 023WWR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,964.27	$ 17,783.48	$ 17,183.48	$ 17,514.27	$ 18,223.48	$ 18,244.98	$ 18,333.48	$ 17,623.48	$ 17,814.27	$ 17,733.48
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,480.33	$ 26,710.79	$ 25,809.59	$ 26,306.43	$ 27,371.67	$ 27,403.96	$ 27,536.89	$ 26,470.47	$ 26,757.03	$ 26,635.69
Net Present Value [$]	$ 7,651.8	$ 6,114.28	$ 7,732.23	$ 7,820.85	$ 5,873.97	$ 6,267.03	$ 6,343.21	$ 7,486.62	$ 7,867.77	$ 7,901.04
Incremental dollars per GHG saving	$ 1.25	$ 1.25	$ 1.26	$ 1.28	$ 1.29	$ 1.29	$ 1.29	$ 1.29	$ 1.29	$ 1.29
Auxiliary Energy Required Heating [GJ/yr]	156	155.7	154	156	153.6	154.6	155.7	151.9	156	154
Annual Energy DHW [GJ/yr]	26.7	15.8	26.7	25	15.8	15.8	14.3	26.7	23.9	25
Annual Energy Space Heating [GJ/yr]	77	76.5	76.2	77	75.6	76.1	76.5	75.2	77	76.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.8	1.1	1.8	1.8	1.8	1.8	1.1	1.8
Total Energy [GJ/yr]	132.2	121.4	132	130.5	120.5	121	120	131.1	129.4	130.3
Design Heating Load [W]	26174.6	25293.9	25704	26174.6	25084.2	25096.3	25293.9	25494.2	26174.6	25704
Annual Energy Electricity [kWh/yr]	29306.4	29345.5	29250.8	29306.4	29081.3	29225.6	29347	28984.2	29306.4	29250.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,083.54	$ 4,089.07	$ 4,075.67	$ 4,083.54	$ 4,051.69	$ 4,072.11	$ 4,089.29	$ 4,037.95	$ 4,083.54	$ 4,075.67
Annual Energy Natural Gas [m3/yr]	717.3	423.9	717.8	671.8	423.9	423.9	385.1	717.9	641.6	672.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.42	$ 182.86	$ 309.63	$ 289.79	$ 182.86	$ 182.86	$ 166.12	$ 309.68	$ 276.76	$ 290.01
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	171460	169591	169588	171461	169609	169861	169592	169606	171462	169589
Upgrade Package List	Pkg2131102031	Pkg2121101032	Pkg2121101032	Pkg2131102031	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2121101033	Pkg2131102031	Pkg2121101032
GHGI [kg/m2]	3.32	2.22	3.32	3.15	2.21	2.22	2.07	3.31	3.03	3.15
% ICC	1.5%	1.6%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	84.8	84.6	83.7	84.8	83.5	84.1	84.7	82.6	84.8	83.7
Output: MEUI [kWh/(m2 * yr)]	57.8	51.9	57.7	56.9	51.4	51.7	51.1	57.2	56.3	56.8
Output: Better than ERS (%)	4620.0%	4920.0%	4630.0%	4690.0%	4960.0%	4940.0%	4980.0%	4660.0%	4730.0%	4700.0%
Output: Better than Envelope (%)	610.0%	630.0%	730.0%	610.0%	760.0%	700.0%	630.0%	860.0%	610.0%	730.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19901	19940	19845	19901	19676	19820	19941	19579	19901	19845
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,806.01	$ 2,811.53	$ 2,798.17	$ 2,806.01	$ 2,774.27	$ 2,794.62	$ 2,811.74	$ 2,760.58	$ 2,806.01	$ 2,798.17
Annual savings in carbon tax for electricity [$/year]	$ 9.95	$ 9.97	$ 9.92	$ 9.95	$ 9.84	$ 9.91	$ 9.97	$ 9.79	$ 9.95	$ 9.92
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,815.96	$ 2,821.5	$ 2,808.1	$ 2,815.96	$ 2,784.11	$ 2,804.53	$ 2,821.71	$ 2,770.37	$ 2,815.96	$ 2,808.1
Annual savings in GHG from electricity savings [kg CO2e/year]	218.9	219.3	218.3	218.9	216.4	218	219.4	215.4	218.9	218.3
Annual savings in natural gas [m3/year]	269.32	280.25	269.3	271.01	280.25	280.25	281.7	269.3	272.14	271
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,495.24	$ 2,596.52	$ 2,495.06	$ 2,510.94	$ 2,596.52	$ 2,596.52	$ 2,609.91	$ 2,495.03	$ 2,521.37	$ 2,510.77
Annual savings in carbon tax for natural gas [$/year]	$ 622.8	$ 648.08	$ 622.76	$ 626.72	$ 648.08	$ 648.08	$ 651.42	$ 622.75	$ 629.32	$ 626.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,118.04	$ 3,244.6	$ 3,117.82	$ 3,137.66	$ 3,244.6	$ 3,244.6	$ 3,261.34	$ 3,117.78	$ 3,150.69	$ 3,137.45
Annual savings in GHG from natural gas savings [kg CO2e/year]	13840	14401.8	13839	13927.1	14401.8	14401.8	14476	13838.8	13984.9	13926.1
Net Present Value [$]	$ 7,651.8	$ 6,114.28	$ 7,732.23	$ 7,820.85	$ 5,873.97	$ 6,267.03	$ 6,343.21	$ 7,486.62	$ 7,867.77	$ 7,901.04
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26	$ 5,610.26
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	NA	HRV sre 60
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$.	$ 1,360.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$ 850.	$ 550.

LARGE 023WWR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,729.53	$ 16,891.03	$ 17,191.03	$ 17,020.32	$ 17,108.82	$ 17,679.53	$ 17,408.82	$ 17,239.53	$ 17,570.32	$ 18,141.03
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,127.75	$ 25,370.33	$ 25,820.93	$ 25,564.52	$ 25,697.45	$ 26,554.65	$ 26,148.05	$ 25,893.77	$ 26,390.62	$ 27,247.83
Net Present Value [$]	$ 14,552.15	$ 14,450.39	$ 14,362.82	$ 14,362.05	$ 14,323.73	$ 14,239.66	$ 14,236.1	$ 14,152.42	$ 14,133.43	$ 14,049.37
Incremental dollars per GHG saving	$ 2.59	$ 2.61	$ 2.63	$ 2.62	$ 2.63	$ 2.64	$ 2.66	$ 2.62	$ 2.68	$ 2.68
Auxiliary Energy Required Heating [GJ/yr]	150.8	149.7	149.7	148.2	149.3	144.2	149.3	146.3	148.2	143.1
Annual Energy DHW [GJ/yr]	13.4	14.3	13.4	15.8	14.3	15.8	13.4	15.8	14.3	15.8
Annual Energy Space Heating [GJ/yr]	159.7	158.6	158.6	157	158.2	152.7	158.2	155	157	151.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.8
Total Energy [GJ/yr]	199.9	199.7	198.7	199.6	199.3	195.9	198.3	198.2	198.1	194.7
Design Heating Load [W]	24847.8	24650.2	24650.2	24494.3	24691.9	23814	24691.9	24023.7	24494.3	23616.4
Annual Energy Electricity [kWh/yr]	8231.1	8225.2	8225.3	8217.4	8223.3	8378.5	8223.4	8389.7	8217.5	8372.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,101.39	$ 1,100.55	$ 1,100.56	$ 1,099.45	$ 1,100.28	$ 1,122.24	$ 1,100.3	$ 1,123.83	$ 1,099.46	$ 1,121.42
Annual Energy Natural Gas [m3/yr]	4572	4566.7	4541.3	4564.2	4556.4	4450.6	4531	4510.1	4525.8	4420
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,972.2	$ 1,969.92	$ 1,958.96	$ 1,968.84	$ 1,965.47	$ 1,919.83	$ 1,954.52	$ 1,945.5	$ 1,952.27	$ 1,906.63
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	175938	176207	176208	179338	179069	175972	179070	175954	179339	176242
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2231102031	Pkg2231101031	Pkg2221101033	Pkg2231101031	Pkg2221101032	Pkg2231102031	Pkg2221102033
GHGI [kg/m2]	17.31	17.29	17.19	17.28	17.25	16.86	17.15	17.08	17.14	16.74
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.5%	1.5%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	82	81.4	81.4	80.6	81.2	78.4	81.2	79.5	80.6	77.8
Output: MEUI [kWh/(m2 * yr)]	94.7	94.6	94.1	94.5	94.4	92.6	93.9	93.8	93.8	91.9
Output: Better than ERS (%)	1870.0%	1880.0%	1920.0%	1890.0%	1900.0%	2040.0%	1940.0%	1940.0%	1950.0%	2090.0%
Output: Better than Envelope (%)	930.0%	990.0%	990.0%	1080.0%	1020.0%	1320.0%	1020.0%	1200.0%	1080.0%	1390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1174	1180	1180	1188	1182	1027	1182	1016	1188	1033
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 165.6	$ 166.44	$ 166.42	$ 167.54	$ 166.7	$ 144.82	$ 166.69	$ 143.24	$ 167.52	$ 145.64
Annual savings in carbon tax for electricity [$/year]	$ .59	$ .59	$ .59	$ .59	$ .59	$ .51	$ .59	$ .51	$ .59	$ .52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 166.19	$ 167.03	$ 167.01	$ 168.13	$ 167.3	$ 145.33	$ 167.28	$ 143.75	$ 168.12	$ 146.16
Annual savings in GHG from electricity savings [kg CO2e/year]	12.9	13	13	13.1	13	11.3	13	11.2	13.1	11.4
Annual savings in natural gas [m3/year]	125.7	125.89	126.84	125.99	126.28	130.22	127.22	128	127.42	131.36
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,164.58	$ 1,166.41	$ 1,175.18	$ 1,167.27	$ 1,169.97	$ 1,206.49	$ 1,178.73	$ 1,185.95	$ 1,180.53	$ 1,217.05
Annual savings in carbon tax for natural gas [$/year]	$ 290.67	$ 291.13	$ 293.32	$ 291.35	$ 292.02	$ 301.13	$ 294.21	$ 296.01	$ 294.65	$ 303.77
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,455.25	$ 1,457.54	$ 1,468.5	$ 1,458.62	$ 1,461.98	$ 1,507.62	$ 1,472.94	$ 1,481.95	$ 1,475.18	$ 1,520.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	6459.4	6469.6	6518.2	6474.3	6489.3	6691.9	6537.9	6577.9	6547.9	6750.4
Net Present Value [$]	$ 14,552.15	$ 14,450.39	$ 14,362.82	$ 14,362.05	$ 14,323.73	$ 14,239.66	$ 14,236.1	$ 14,152.42	$ 14,133.43	$ 14,049.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	10.47	8.77	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 60	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,800.	$.	$ 1,360.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.

LARGE 023WWR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 24,832.78	$ 25,012.07	$ 25,050.57	$ 25,168.65	$ 25,382.78	$ 25,512.07	$ 25,562.07	$ 25,600.57	$ 25,608.65	$ 25,630.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,298.84	$ 37,568.13	$ 37,625.96	$ 37,803.31	$ 38,124.94	$ 38,319.13	$ 38,394.23	$ 38,452.06	$ 38,464.19	$ 38,496.49
Net Present Value [$]	$ 8,138.26	$ 8,172.1	$ 8,210.23	$ 7,540.88	$ 8,307.06	$ 8,352.76	$ 8,340.9	$ 8,379.04	$ 7,293.69	$ 7,686.02
Incremental dollars per GHG saving	$ 1.82	$ 1.83	$ 1.84	$ 1.84	$ 1.85	$ 1.87	$ 1.86	$ 1.86	$ 1.88	$ 1.88
Auxiliary Energy Required Heating [GJ/yr]	132.8	132.6	132.5	130.5	132.8	131.4	132.6	132.5	128.4	129.4
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	26.7	25	26.7	25	25	26.7	26.7
Annual Energy Space Heating [GJ/yr]	66.1	65.9	65.9	64.8	66.1	65.4	65.9	65.9	63.8	64.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	121.9	121.7	121.7	120.6	120.2	121.3	120	120	119.6	120.2
Design Heating Load [W]	22718.4	22607.5	22760.1	22360.4	22718.4	22562.5	22607.5	22760.1	22150.6	22162.8
Annual Energy Electricity [kWh/yr]	26436.3	26381.4	26381	26074.2	26436.3	26257.1	26381.4	26381	25806.9	25950.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,677.42	$ 3,669.65	$ 3,669.6	$ 3,626.18	$ 3,677.42	$ 3,652.06	$ 3,669.65	$ 3,669.6	$ 3,588.36	$ 3,608.74
Annual Energy Natural Gas [m3/yr]	718.1	717.6	717.7	718	672.6	717.7	672.1	672.2	718.1	718.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.76	$ 309.55	$ 309.59	$ 309.72	$ 290.14	$ 309.59	$ 289.92	$ 289.96	$ 309.76	$ 309.76
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	194014	195940	195742	201538	194015	195958	195941	195743	201556	201754
Upgrade Package List	Pkg3221202034	Pkg3231202033	Pkg3231201034	Pkg3221201032	Pkg3221202034	Pkg3231202034	Pkg3231202033	Pkg3231201034	Pkg3321201033	Pkg3321202032
GHGI [kg/m2]	3.26	3.26	3.26	3.25	3.09	3.25	3.09	3.09	3.25	3.25
% ICC	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	72.2	72.1	72	70.9	72.2	71.4	72.1	72	69.8	70.4
Output: MEUI [kWh/(m2 * yr)]	52.2	52.1	52.1	51.5	51.3	51.8	51.2	51.2	51	51.2
Output: Better than ERS (%)	5040.0%	5050.0%	5050.0%	5090.0%	5110.0%	5060.0%	5120.0%	5120.0%	5130.0%	5110.0%
Output: Better than Envelope (%)	2010.0%	2020.0%	2030.0%	2150.0%	2010.0%	2090.0%	2020.0%	2030.0%	2270.0%	2210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17031	16976	16975	16669	17031	16852	16976	16975	16401	16545
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,401.33	$ 2,393.59	$ 2,393.53	$ 2,350.27	$ 2,401.33	$ 2,376.06	$ 2,393.59	$ 2,393.53	$ 2,312.58	$ 2,332.89
Annual savings in carbon tax for electricity [$/year]	$ 8.52	$ 8.49	$ 8.49	$ 8.33	$ 8.52	$ 8.43	$ 8.49	$ 8.49	$ 8.2	$ 8.27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,409.84	$ 2,402.08	$ 2,402.02	$ 2,358.61	$ 2,409.84	$ 2,384.49	$ 2,402.08	$ 2,402.02	$ 2,320.78	$ 2,341.16
Annual savings in GHG from electricity savings [kg CO2e/year]	187.3	186.7	186.7	183.4	187.3	185.4	186.7	186.7	180.4	182
Annual savings in natural gas [m3/year]	269.29	269.31	269.3	269.29	270.98	269.3	271	271	269.29	269.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,494.96	$ 2,495.13	$ 2,495.1	$ 2,495.	$ 2,510.67	$ 2,495.1	$ 2,510.84	$ 2,510.81	$ 2,494.96	$ 2,494.96
Annual savings in carbon tax for natural gas [$/year]	$ 622.73	$ 622.77	$ 622.76	$ 622.74	$ 626.65	$ 622.76	$ 626.69	$ 626.69	$ 622.73	$ 622.73
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,117.69	$ 3,117.91	$ 3,117.86	$ 3,117.73	$ 3,137.32	$ 3,117.86	$ 3,137.53	$ 3,137.49	$ 3,117.69	$ 3,117.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	13838.5	13839.4	13839.2	13838.6	13925.6	13839.2	13926.5	13926.3	13838.5	13838.5
Net Present Value [$]	$ 8,138.26	$ 8,172.1	$ 8,210.23	$ 7,540.88	$ 8,307.06	$ 8,352.76	$ 8,340.9	$ 8,379.04	$ 7,293.69	$ 7,686.02
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	8.77	10.47	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	7.04	5.28	5.28	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 9,953.68	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$ 550.	$.	$.

LARGE 023WWR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 25,768.65	$ 24,832.78	$ 25,012.07	$ 25,050.57	$ 26,318.65	$ 26,208.65	$ 25,168.65	$ 26,230.15	$ 25,382.78	$ 26,618.65
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,704.51	$ 37,298.84	$ 37,568.13	$ 37,625.96	$ 39,530.61	$ 39,365.39	$ 37,803.31	$ 39,397.69	$ 38,124.94	$ 39,981.21
Net Present Value [$]	$ 5,933.15	$ 8,138.26	$ 8,172.1	$ 8,210.23	$ 6,162.27	$ 5,692.3	$ 7,540.88	$ 6,073.67	$ 8,307.06	$ 6,249.36
Incremental dollars per GHG saving	$ 1.81	$ 1.82	$ 1.83	$ 1.84	$ 1.84	$ 1.84	$ 1.84	$ 1.85	$ 1.85	$ 1.86
Auxiliary Energy Required Heating [GJ/yr]	132.2	132.8	132.6	132.5	132.2	130.1	130.5	131.1	132.8	132.2
Annual Energy DHW [GJ/yr]	15.8	26.7	26.7	26.7	14.3	15.8	26.7	15.8	25	13.4
Annual Energy Space Heating [GJ/yr]	65.2	66.1	65.9	65.9	65.2	64.2	64.8	64.7	66.1	65.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	110	121.9	121.7	121.7	108.6	109.1	120.6	109.6	120.2	107.6
Design Heating Load [W]	21953	22718.4	22607.5	22760.1	21953	21743.2	22360.4	21755.4	22718.4	21953
Annual Energy Electricity [kWh/yr]	26173.5	26436.3	26381.4	26381	26175	25909	26074.2	26048.8	26436.3	26176
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,640.24	$ 3,677.42	$ 3,669.65	$ 3,669.6	$ 3,640.45	$ 3,602.81	$ 3,626.18	$ 3,622.59	$ 3,677.42	$ 3,640.59
Annual Energy Natural Gas [m3/yr]	423.9	718.1	717.6	717.7	385.1	423.9	718	423.9	672.6	359.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 309.76	$ 309.55	$ 309.59	$ 166.12	$ 182.86	$ 309.72	$ 182.86	$ 290.14	$ 155.03
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	201541	194014	195940	195742	201542	201559	201538	201757	194015	201543
Upgrade Package List	Pkg3321201032	Pkg3321202034	Pkg3321202033	Pkg3231201034	Pkg3321201032	Pkg3321201033	Pkg3321201032	Pkg3321202032	Pkg3321202034	Pkg3321201032
GHGI [kg/m2]	2.15	3.26	3.26	3.26	2.01	2.15	3.25	2.15	3.09	1.91
% ICC	2.3%	2.2%	2.2%	2.2%	2.3%	2.3%	2.2%	2.3%	2.3%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	71.9	72.2	72.1	72	71.9	70.7	70.9	71.3	72.2	71.9
Output: MEUI [kWh/(m2 * yr)]	45.7	52.2	52.1	52.1	44.9	45.2	51.5	45.5	51.3	44.4
Output: Better than ERS (%)	5400.0%	5040.0%	5050.0%	5050.0%	5460.0%	5440.0%	5090.0%	5420.0%	5110.0%	5500.0%
Output: Better than Envelope (%)	2050.0%	2010.0%	2020.0%	2030.0%	2050.0%	2170.0%	2150.0%	2110.0%	2010.0%	2050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16768	17031	16976	16975	16769	16503	16669	16643	17031	16770
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,364.27	$ 2,401.33	$ 2,393.59	$ 2,393.53	$ 2,364.49	$ 2,326.98	$ 2,350.27	$ 2,346.69	$ 2,401.33	$ 2,364.63
Annual savings in carbon tax for electricity [$/year]	$ 8.38	$ 8.52	$ 8.49	$ 8.49	$ 8.38	$ 8.25	$ 8.33	$ 8.32	$ 8.52	$ 8.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,372.66	$ 2,409.84	$ 2,402.08	$ 2,402.02	$ 2,372.87	$ 2,335.23	$ 2,358.61	$ 2,355.01	$ 2,409.84	$ 2,373.01
Annual savings in GHG from electricity savings [kg CO2e/year]	184.4	187.3	186.7	186.7	184.5	181.5	183.4	183.1	187.3	184.5
Annual savings in natural gas [m3/year]	280.25	269.29	269.31	269.3	281.7	280.25	269.29	280.25	270.98	282.65
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,596.52	$ 2,494.96	$ 2,495.13	$ 2,495.1	$ 2,609.91	$ 2,596.52	$ 2,495.	$ 2,596.52	$ 2,510.67	$ 2,618.79
Annual savings in carbon tax for natural gas [$/year]	$ 648.08	$ 622.73	$ 622.77	$ 622.76	$ 651.42	$ 648.08	$ 622.74	$ 648.08	$ 626.65	$ 653.64
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,244.6	$ 3,117.69	$ 3,117.91	$ 3,117.86	$ 3,261.34	$ 3,244.6	$ 3,117.73	$ 3,244.6	$ 3,137.32	$ 3,272.42
Annual savings in GHG from natural gas savings [kg CO2e/year]	14401.8	13838.5	13839.4	13839.2	14476	14401.8	13838.6	14401.8	13925.6	14525.3
Net Present Value [$]	$ 5,933.15	$ 8,138.26	$ 8,172.1	$ 8,210.23	$ 6,162.27	$ 5,692.3	$ 7,540.88	$ 6,073.67	$ 8,307.06	$ 6,249.36
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	5.28	5.28	5.28	7.04	7.04	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$.	$.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.

LARGE 023WWR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 46,330.85	$ 46,380.85	$ 46,680.85	$ 46,510.14	$ 46,880.85	$ 47,180.85	$ 47,010.14	$ 47,060.14	$ 47,360.14	$ 47,560.14
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 69,588.94	$ 69,664.04	$ 70,114.64	$ 69,858.23	$ 70,415.04	$ 70,865.64	$ 70,609.23	$ 70,684.33	$ 71,134.93	$ 71,435.33
Net Present Value [$]	$ 4,558.87	$ 4,579.26	$ 4,666.64	$ 4,678.82	$ 4,787.73	$ 4,874.2	$ 4,888.26	$ 4,906.53	$ 4,994.1	$ 5,116.7
Incremental dollars per GHG saving	$ 5.25	$ 5.24	$ 5.25	$ 5.26	$ 5.26	$ 5.27	$ 5.28	$ 5.28	$ 5.28	$ 5.29
Auxiliary Energy Required Heating [GJ/yr]	104.4	105.6	105.6	104.1	104.4	104.4	102.9	104.1	104.1	103
Annual Energy DHW [GJ/yr]	15.8	14.3	13.4	15.8	14.3	13.4	15.8	14.3	13.4	14.3
Annual Energy Space Heating [GJ/yr]	110.5	111.8	111.8	110.3	110.6	110.6	109	110.3	110.3	109.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	153.8	153.6	152.6	153.5	152.3	151.4	152.3	152.1	151.1	150.8
Design Heating Load [W]	18195.3	18240.3	18240.3	18084.4	18195.3	18195.3	18039.5	18084.4	18084.4	18039.5
Annual Energy Electricity [kWh/yr]	8168.1	8174.4	8174.5	8166.8	8168.2	8168.2	8160.6	8166.9	8167	8160.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,092.47	$ 1,093.36	$ 1,093.38	$ 1,092.29	$ 1,092.49	$ 1,092.49	$ 1,091.41	$ 1,092.3	$ 1,092.32	$ 1,091.42
Annual Energy Natural Gas [m3/yr]	3339	3333.5	3308.1	3332.3	3300.6	3275.1	3299.5	3293.8	3268.4	3261.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,440.33	$ 1,437.96	$ 1,427.	$ 1,437.44	$ 1,423.76	$ 1,412.76	$ 1,423.29	$ 1,420.83	$ 1,409.87	$ 1,406.72
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	209182	209165	209166	209740	209183	209184	209758	209741	209742	209759
Upgrade Package List	Pkg4321302054	Pkg4321302053	Pkg4321302053	Pkg4331302053	Pkg4321302054	Pkg4321302054	Pkg4331302054	Pkg4331302053	Pkg4331302053	Pkg4331302054
GHGI [kg/m2]	12.69	12.67	12.57	12.66	12.54	12.45	12.54	12.52	12.42	12.39
% ICC	4.1%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	56.7	57.4	57.4	56.6	56.7	56.7	56	56.6	56.6	56
Output: MEUI [kWh/(m2 * yr)]	69.7	69.6	69	69.5	68.9	68.4	68.8	68.7	68.2	68.1
Output: Better than ERS (%)	3750.0%	3760.0%	3800.0%	3760.0%	3810.0%	3850.0%	3810.0%	3820.0%	3860.0%	3870.0%
Output: Better than Envelope (%)	3720.0%	3650.0%	3650.0%	3740.0%	3720.0%	3720.0%	3810.0%	3740.0%	3740.0%	3800.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1238	1231	1231	1239	1237	1237	1245	1239	1239	1245
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 174.49	$ 173.6	$ 173.59	$ 174.67	$ 174.47	$ 174.47	$ 175.54	$ 174.66	$ 174.64	$ 175.53
Annual savings in carbon tax for electricity [$/year]	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62	$ .62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 175.11	$ 174.21	$ 174.2	$ 175.29	$ 175.09	$ 175.09	$ 176.17	$ 175.28	$ 175.26	$ 176.15
Annual savings in GHG from electricity savings [kg CO2e/year]	13.6	13.5	13.5	13.6	13.6	13.6	13.7	13.6	13.6	13.7
Annual savings in natural gas [m3/year]	171.64	171.84	172.79	171.89	173.07	174.02	173.11	173.32	174.27	174.54
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,590.22	$ 1,592.11	$ 1,600.88	$ 1,592.53	$ 1,603.47	$ 1,612.27	$ 1,603.85	$ 1,605.82	$ 1,614.59	$ 1,617.11
Annual savings in carbon tax for natural gas [$/year]	$ 396.91	$ 397.38	$ 399.57	$ 397.49	$ 400.22	$ 402.42	$ 400.31	$ 400.8	$ 402.99	$ 403.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,987.13	$ 1,989.5	$ 2,000.46	$ 1,990.02	$ 2,003.69	$ 2,014.69	$ 2,004.17	$ 2,006.62	$ 2,017.58	$ 2,020.73
Annual savings in GHG from natural gas savings [kg CO2e/year]	8820.2	8830.8	8879.4	8833.1	8893.8	8942.6	8895.9	8906.8	8955.4	8969.4
Net Present Value [$]	$ 4,558.87	$ 4,579.26	$ 4,666.64	$ 4,678.82	$ 4,787.73	$ 4,874.2	$ 4,888.26	$ 4,906.53	$ 4,994.1	$ 5,116.7
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$ 550.

LARGE 023WWR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 18,141.03	$ 18,229.53	$ 18,358.82	$ 18,529.53	$ 18,691.03	$ 18,820.32	$ 18,908.82	$ 18,930.32	$ 18,991.03	$ 19,070.32
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,247.83	$ 27,380.75	$ 27,574.95	$ 27,831.35	$ 28,073.93	$ 28,268.12	$ 28,401.05	$ 28,433.34	$ 28,524.53	$ 28,643.62
Net Present Value [$]	$ 19,259.85	$ 19,173.78	$ 19,131.67	$ 19,096.77	$ 19,045.67	$ 19,002.42	$ 18,917.5	$ 18,613.14	$ 18,968.48	$ 17,258.81
Incremental dollars per GHG saving	$ 2.3	$ 2.31	$ 2.32	$ 2.34	$ 2.35	$ 2.36	$ 2.37	$ 2.39	$ 2.37	$ 2.5
Auxiliary Energy Required Heating [GJ/yr]	183.8	185.1	183.4	185.1	183.8	182.1	183.4	184.6	183.8	180.8
Annual Energy DHW [GJ/yr]	16.2	14.7	16.2	13.7	14.7	16.2	14.7	14.7	13.7	24.2
Annual Energy Space Heating [GJ/yr]	194.7	196.1	194.3	196.1	194.7	192.8	194.3	195.5	194.7	191.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	238.2	238.2	237.9	237.2	236.7	236.4	236.4	237.6	235.8	243.1
Design Heating Load [W]	25514.1	25725.6	25554.8	25725.6	25514.1	25343.4	25554.8	25567.9	25514.1	25795.2
Annual Energy Electricity [kWh/yr]	8587.9	8595.1	8586	8595.1	8587.9	8578.9	8586	8592.1	8588	8572.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,151.87	$ 1,152.89	$ 1,151.6	$ 1,152.89	$ 1,151.87	$ 1,150.6	$ 1,151.6	$ 1,152.47	$ 1,151.89	$ 1,149.65
Annual Energy Natural Gas [m3/yr]	5567.2	5564.7	5557.1	5538.1	5527.1	5519.6	5517	5548.9	5500.5	5700
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,401.5	$ 2,400.42	$ 2,397.14	$ 2,388.94	$ 2,384.2	$ 2,380.96	$ 2,379.84	$ 2,393.6	$ 2,372.72	$ 2,458.78
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70834	70565	73696	70566	70835	73966	73697	73949	70836	73965
Upgrade Package List	Pkg2221102033	Pkg2221101033	Pkg2231101033	Pkg2221101033	Pkg2221102033	Pkg2231102033	Pkg2231101033	Pkg2231102032	Pkg2221102033	Pkg2231102033
GHGI [kg/m2]	21.05	21.04	21.01	20.94	20.89	20.87	20.86	20.98	20.8	21.54
% ICC	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	99.9	100.6	99.7	100.6	99.9	99	99.7	100.3	99.9	98.3
Output: MEUI [kWh/(m2 * yr)]	115.6	115.5	115.4	115	114.8	114.6	114.6	115.2	114.2	118.2
Output: Better than ERS (%)	2010.0%	2010.0%	2020.0%	2050.0%	2070.0%	2080.0%	2080.0%	2030.0%	2100.0%	2030.0%
Output: Better than Envelope (%)	140.0%	70.0%	160.0%	70.0%	140.0%	230.0%	160.0%	100.0%	140.0%	300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1157	1150	1159	1150	1157	1166	1159	1153	1157	1173
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 163.19	$ 162.18	$ 163.46	$ 162.18	$ 163.19	$ 164.46	$ 163.46	$ 162.6	$ 163.18	$ 165.41
Annual savings in carbon tax for electricity [$/year]	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 163.77	$ 162.75	$ 164.04	$ 162.75	$ 163.77	$ 165.05	$ 164.04	$ 163.18	$ 163.76	$ 165.99
Annual savings in GHG from electricity savings [kg CO2e/year]	12.7	12.7	12.8	12.7	12.7	12.8	12.8	12.7	12.7	12.9
Annual savings in natural gas [m3/year]	153.11	153.2	153.49	154.2	154.61	154.89	154.98	153.79	155.6	148.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,418.58	$ 1,419.44	$ 1,422.07	$ 1,428.63	$ 1,432.42	$ 1,435.01	$ 1,435.91	$ 1,424.9	$ 1,441.61	$ 1,372.74
Annual savings in carbon tax for natural gas [$/year]	$ 354.07	$ 354.29	$ 354.94	$ 356.58	$ 357.53	$ 358.17	$ 358.4	$ 355.65	$ 359.82	$ 342.63
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,772.65	$ 1,773.73	$ 1,777.01	$ 1,785.2	$ 1,789.95	$ 1,793.18	$ 1,794.31	$ 1,780.55	$ 1,801.42	$ 1,715.37
Annual savings in GHG from natural gas savings [kg CO2e/year]	7868.2	7873	7887.6	7924	7945	7959.4	7964.4	7903.3	7996	7614
Net Present Value [$]	$ 19,259.85	$ 19,173.78	$ 19,131.67	$ 19,096.77	$ 19,045.67	$ 19,002.42	$ 18,917.5	$ 18,613.14	$ 18,968.48	$ 17,258.81
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	8.77	10.47	10.47	8.77	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE 023WWR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 20,829.53	$ 20,229.53	$ 20,251.03	$ 20,468.82	$ 21,291.03	$ 21,379.53	$ 20,779.53	$ 20,691.03	$ 20,801.03	$ 21,508.82
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,285.95	$ 30,384.75	$ 30,417.05	$ 30,744.17	$ 31,979.13	$ 32,112.05	$ 31,210.85	$ 31,077.93	$ 31,243.15	$ 32,306.25
Net Present Value [$]	$ 12,848.82	$ 14,644.69	$ 15,111.15	$ 15,158.84	$ 12,852.03	$ 13,065.32	$ 14,797.47	$ 14,657.02	$ 15,263.93	$ 12,914.08
Incremental dollars per GHG saving	$ 1.2	$ 1.2	$ 1.2	$ 1.22	$ 1.22	$ 1.22	$ 1.23	$ 1.23	$ 1.23	$ 1.24
Auxiliary Energy Required Heating [GJ/yr]	184.6	183.4	184.5	184.2	183.3	184.6	183.4	182	184.5	182.9
Annual Energy DHW [GJ/yr]	16.2	27.2	27.2	27.2	16.2	14.7	25.4	27.2	25.4	16.2
Annual Energy Space Heating [GJ/yr]	101.8	101.7	102.3	102.1	101.2	101.8	101.7	101.1	102.3	101
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	148.3	159.2	159.9	159.6	147.7	146.8	157.5	158.6	158.1	147.5
Design Heating Load [W]	25824	26276.8	26289.8	26330.5	25612.5	25824	26276.8	26065.3	26289.8	25653.2
Annual Energy Electricity [kWh/yr]	36716.8	36685.6	36858.4	36793.7	36538.8	36718.6	36685.6	36510.8	36858.4	36478.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,132.11	$ 5,127.7	$ 5,152.15	$ 5,142.99	$ 5,106.93	$ 5,132.37	$ 5,127.7	$ 5,102.96	$ 5,152.15	$ 5,098.36
Annual Energy Natural Gas [m3/yr]	434.1	729.7	729.7	729.3	434.1	393.7	682.3	729.8	682.3	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 314.77	$ 314.77	$ 314.59	$ 187.26	$ 169.83	$ 294.32	$ 314.81	$ 294.32	$ 187.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70573	70570	70822	73684	70843	70574	70571	70840	70823	73705
Upgrade Package List	Pkg2221101033	Pkg2221101033	Pkg2221102032	Pkg2231101032	Pkg2221102033	Pkg2221101033	Pkg2221101033	Pkg2221102033	Pkg2221102032	Pkg2231101033
GHGI [kg/m2]	2.42	3.52	3.53	3.52	2.41	2.27	3.35	3.52	3.35	2.41
% ICC	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.8%	1.8%	1.8%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	100.3	99.7	100.3	100.1	99.6	100.4	99.7	99	100.3	99.4
Output: MEUI [kWh/(m2 * yr)]	66.4	72.4	72.7	72.6	66.1	65.6	71.4	72	71.7	66
Output: Better than ERS (%)	4880.0%	4630.0%	4610.0%	4620.0%	4900.0%	4930.0%	4690.0%	4650.0%	4670.0%	4900.0%
Output: Better than Envelope (%)	100.0%	160.0%	100.0%	120.0%	170.0%	100.0%	160.0%	240.0%	100.0%	190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26972	26940	27113	27048	26794	26973	26940	26766	27113	26733
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,802.98	$ 3,798.58	$ 3,822.95	$ 3,813.82	$ 3,777.88	$ 3,803.24	$ 3,798.58	$ 3,773.94	$ 3,822.95	$ 3,769.35
Annual savings in carbon tax for electricity [$/year]	$ 13.49	$ 13.47	$ 13.56	$ 13.52	$ 13.4	$ 13.49	$ 13.47	$ 13.38	$ 13.56	$ 13.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,816.47	$ 3,812.05	$ 3,836.5	$ 3,827.35	$ 3,791.28	$ 3,816.72	$ 3,812.05	$ 3,787.32	$ 3,836.5	$ 3,782.72
Annual savings in GHG from electricity savings [kg CO2e/year]	296.7	296.3	298.2	297.5	294.7	296.7	296.3	294.4	298.2	294.1
Annual savings in natural gas [m3/year]	344.37	333.35	333.35	333.37	344.37	345.87	335.12	333.35	335.12	344.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,190.55	$ 3,088.5	$ 3,088.5	$ 3,088.64	$ 3,190.55	$ 3,204.49	$ 3,104.87	$ 3,088.47	$ 3,104.87	$ 3,190.55
Annual savings in carbon tax for natural gas [$/year]	$ 796.35	$ 770.88	$ 770.88	$ 770.91	$ 796.35	$ 799.83	$ 774.96	$ 770.87	$ 774.96	$ 796.35
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,986.89	$ 3,859.38	$ 3,859.38	$ 3,859.55	$ 3,986.89	$ 4,004.32	$ 3,879.83	$ 3,859.34	$ 3,879.83	$ 3,986.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	17696.6	17130.6	17130.6	17131.3	17696.6	17773.9	17221.3	17130.4	17221.3	17696.6
Net Present Value [$]	$ 12,848.82	$ 14,644.69	$ 15,111.15	$ 15,158.84	$ 12,852.03	$ 13,065.32	$ 14,797.47	$ 14,657.02	$ 15,263.93	$ 12,914.08
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$.	$.	$ 600.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 550.	$.

LARGE 023WWR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,141.03	$ 18,229.53	$ 18,358.82	$ 18,529.53	$ 18,691.03	$ 18,820.32	$ 18,991.03	$ 18,908.82	$ 19,208.82	$ 19,370.32
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,247.83	$ 27,380.75	$ 27,574.95	$ 27,831.35	$ 28,073.93	$ 28,268.12	$ 28,524.53	$ 28,401.05	$ 28,851.65	$ 29,094.22
Net Present Value [$]	$ 19,259.85	$ 19,173.78	$ 19,131.67	$ 19,096.77	$ 19,045.67	$ 19,002.42	$ 18,968.48	$ 18,917.5	$ 18,840.06	$ 18,788.48
Incremental dollars per GHG saving	$ 2.3	$ 2.31	$ 2.32	$ 2.34	$ 2.35	$ 2.36	$ 2.37	$ 2.37	$ 2.39	$ 2.41
Auxiliary Energy Required Heating [GJ/yr]	183.8	185.1	183.4	185.1	183.8	182.1	183.8	183.4	183.4	182.1
Annual Energy DHW [GJ/yr]	16.2	14.7	16.2	13.7	14.7	16.2	13.7	14.7	13.7	14.7
Annual Energy Space Heating [GJ/yr]	194.7	196.1	194.3	196.1	194.7	192.8	194.7	194.3	194.3	192.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	238.2	238.2	237.9	237.2	236.7	236.4	235.8	236.4	235.4	234.9
Design Heating Load [W]	25514.1	25725.6	25554.8	25725.6	25514.1	25343.4	25514.1	25554.8	25554.8	25343.4
Annual Energy Electricity [kWh/yr]	8587.9	8595.1	8586	8595.1	8587.9	8578.9	8588	8586	8586.1	8578.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,151.87	$ 1,152.89	$ 1,151.6	$ 1,152.89	$ 1,151.87	$ 1,150.6	$ 1,151.89	$ 1,151.6	$ 1,151.62	$ 1,150.6
Annual Energy Natural Gas [m3/yr]	5567.2	5564.7	5557.1	5538.1	5527.1	5519.6	5500.5	5517	5490.4	5479.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,401.5	$ 2,400.42	$ 2,397.14	$ 2,388.94	$ 2,384.2	$ 2,380.96	$ 2,372.72	$ 2,379.84	$ 2,368.37	$ 2,363.67
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	70834	70565	73696	70566	70835	73966	70836	73697	73698	73967
Upgrade Package List	Pkg2221102033	Pkg2221101033	Pkg2231101033	Pkg2221101033	Pkg2221102033	Pkg2231102033	Pkg2221102033	Pkg2231101033	Pkg2231101033	Pkg2231102033
GHGI [kg/m2]	21.05	21.04	21.01	20.94	20.89	20.87	20.8	20.86	20.76	20.72
% ICC	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	99.9	100.6	99.7	100.6	99.9	99	99.9	99.7	99.7	99
Output: MEUI [kWh/(m2 * yr)]	115.6	115.5	115.4	115	114.8	114.6	114.2	114.6	114	113.8
Output: Better than ERS (%)	2010.0%	2010.0%	2020.0%	2050.0%	2070.0%	2080.0%	2100.0%	2080.0%	2110.0%	2130.0%
Output: Better than Envelope (%)	140.0%	70.0%	160.0%	70.0%	140.0%	230.0%	140.0%	160.0%	160.0%	230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1157	1150	1159	1150	1157	1166	1157	1159	1159	1166
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 163.19	$ 162.18	$ 163.46	$ 162.18	$ 163.19	$ 164.46	$ 163.18	$ 163.46	$ 163.45	$ 164.46
Annual savings in carbon tax for electricity [$/year]	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58	$ .58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 163.77	$ 162.75	$ 164.04	$ 162.75	$ 163.77	$ 165.05	$ 163.76	$ 164.04	$ 164.03	$ 165.05
Annual savings in GHG from electricity savings [kg CO2e/year]	12.7	12.7	12.8	12.7	12.7	12.8	12.7	12.8	12.8	12.8
Annual savings in natural gas [m3/year]	153.11	153.2	153.49	154.2	154.61	154.89	155.6	154.98	155.97	156.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,418.58	$ 1,419.44	$ 1,422.07	$ 1,428.63	$ 1,432.42	$ 1,435.01	$ 1,441.61	$ 1,435.91	$ 1,445.09	$ 1,448.86
Annual savings in carbon tax for natural gas [$/year]	$ 354.07	$ 354.29	$ 354.94	$ 356.58	$ 357.53	$ 358.17	$ 359.82	$ 358.4	$ 360.69	$ 361.63
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,772.65	$ 1,773.73	$ 1,777.01	$ 1,785.2	$ 1,789.95	$ 1,793.18	$ 1,801.42	$ 1,794.31	$ 1,805.78	$ 1,810.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	7868.2	7873	7887.6	7924	7945	7959.4	7996	7964.4	8015.3	8036.2
Net Present Value [$]	$ 19,259.85	$ 19,173.78	$ 19,131.67	$ 19,096.77	$ 19,045.67	$ 19,002.42	$ 18,968.48	$ 18,917.5	$ 18,840.06	$ 18,788.48
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.

LARGE 023WWR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 45,328.77	$ 45,485.35	$ 45,828.77	$ 45,878.77	$ 45,925.35	$ 45,946.85	$ 45,980.73	$ 46,035.35	$ 46,085.35	$ 46,164.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 68,083.81	$ 68,319.	$ 68,834.81	$ 68,909.91	$ 68,979.88	$ 69,012.17	$ 69,063.06	$ 69,145.1	$ 69,220.2	$ 69,339.29
Net Present Value [$]	$ 26,681.43	$ 25,944.	$ 26,847.48	$ 26,834.46	$ 25,500.65	$ 25,925.67	$ 27,271.05	$ 26,097.03	$ 24,163.18	$ 26,009.15
Incremental dollars per GHG saving	$ 2.68	$ 2.69	$ 2.71	$ 2.7	$ 2.72	$ 2.72	$ 2.72	$ 2.71	$ 2.64	$ 2.73
Auxiliary Energy Required Heating [GJ/yr]	149.2	146.7	148	149.2	144.3	145.3	148.9	146.7	147.9	145
Annual Energy DHW [GJ/yr]	27.2	27.2	27.2	25.4	27.2	27.2	27.2	25.4	16.2	27.2
Annual Energy Space Heating [GJ/yr]	83.4	81.9	82.9	83.4	80.7	81.3	83.3	81.9	82.1	81.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	141	139.7	140.5	139.2	138.5	139.1	140.9	138	128.9	138.9
Design Heating Load [W]	22072	21811.5	22023.9	22072	21587	21600.1	22115.2	21811.5	21361.2	21640.8
Annual Energy Electricity [kWh/yr]	31611.4	31262.8	31481.4	31611.4	30919.4	31076.4	31585.9	31262.8	31301.5	31025.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,409.7	$ 4,360.37	$ 4,391.3	$ 4,409.7	$ 4,311.78	$ 4,334.	$ 4,406.09	$ 4,360.37	$ 4,365.85	$ 4,326.81
Annual Energy Natural Gas [m3/yr]	729.8	730.2	729.9	682.4	730.3	730.2	730.2	682.8	434.1	729.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.81	$ 314.98	$ 314.85	$ 294.36	$ 315.03	$ 314.98	$ 314.98	$ 294.54	$ 187.26	$ 314.81
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	90640	96238	90658	90641	96256	96454	88912	96239	96241	98182
Upgrade Package List	Pkg3231202053	Pkg3321201052	Pkg3231202054	Pkg3231202053	Pkg3321201053	Pkg3321202052	Pkg3221203053	Pkg3321201052	Pkg3321201052	Pkg3331201052
GHGI [kg/m2]	3.42	3.41	3.41	3.24	3.4	3.41	3.42	3.23	2.3	3.4
% ICC	4.0%	4.0%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	81.1	79.7	80.5	81.1	78.4	79	81	79.7	80.4	78.8
Output: MEUI [kWh/(m2 * yr)]	62.4	61.7	62.2	61.5	61.1	61.4	62.4	60.8	55.8	61.3
Output: Better than ERS (%)	5240.0%	5290.0%	5260.0%	5300.0%	5330.0%	5310.0%	5250.0%	5340.0%	5550.0%	5310.0%
Output: Better than Envelope (%)	2000.0%	2130.0%	2060.0%	2000.0%	2260.0%	2200.0%	2010.0%	2130.0%	2070.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	21866	21518	21736	21866	21174	21331	21841	21518	21556	21280
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,083.12	$ 3,033.97	$ 3,064.79	$ 3,083.12	$ 2,985.55	$ 3,007.69	$ 3,079.52	$ 3,033.97	$ 3,039.42	$ 3,000.52
Annual savings in carbon tax for electricity [$/year]	$ 10.93	$ 10.76	$ 10.87	$ 10.93	$ 10.59	$ 10.67	$ 10.92	$ 10.76	$ 10.78	$ 10.64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,094.05	$ 3,044.73	$ 3,075.66	$ 3,094.05	$ 2,996.14	$ 3,018.35	$ 3,090.44	$ 3,044.73	$ 3,050.2	$ 3,011.16
Annual savings in GHG from electricity savings [kg CO2e/year]	240.5	236.7	239.1	240.5	232.9	234.6	240.2	236.7	237.1	234.1
Annual savings in natural gas [m3/year]	333.35	333.33	333.34	335.11	333.33	333.33	333.33	335.1	344.37	333.35
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,088.47	$ 3,088.33	$ 3,088.44	$ 3,104.83	$ 3,088.3	$ 3,088.33	$ 3,088.33	$ 3,104.69	$ 3,190.55	$ 3,088.47
Annual savings in carbon tax for natural gas [$/year]	$ 770.87	$ 770.83	$ 770.86	$ 774.95	$ 770.82	$ 770.83	$ 770.83	$ 774.92	$ 796.35	$ 770.87
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,859.34	$ 3,859.17	$ 3,859.29	$ 3,879.78	$ 3,859.12	$ 3,859.17	$ 3,859.17	$ 3,879.61	$ 3,986.89	$ 3,859.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	17130.4	17129.6	17130.2	17221.1	17129.4	17129.6	17129.6	17220.4	17696.6	17130.4
Net Present Value [$]	$ 26,681.43	$ 25,944.	$ 26,847.48	$ 26,834.46	$ 25,500.65	$ 25,925.67	$ 27,271.05	$ 26,097.03	$ 24,163.18	$ 26,009.15
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	14.09	8.77	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR80	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 2,431.75	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	7.04	5.28	5.28	7.04	7.04	5.28	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 9,953.68	$ 8,216.31	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$.	$.

LARGE 023WWR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 46,085.35	$ 48,260.85	$ 48,440.14	$ 48,478.64	$ 46,635.35	$ 46,428.77	$ 46,525.35	$ 46,546.85	$ 46,935.35	$ 48,810.85
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 69,220.2	$ 72,487.8	$ 72,757.09	$ 72,814.92	$ 70,046.3	$ 69,736.01	$ 69,881.08	$ 69,913.37	$ 70,496.9	$ 73,313.9
Net Present Value [$]	$ 24,163.18	$ 29,915.1	$ 29,838.59	$ 29,999.24	$ 24,379.68	$ 25,068.96	$ 23,719.47	$ 24,160.	$ 24,457.37	$ 29,786.07
Incremental dollars per GHG saving	$ 2.64	$ 2.64	$ 2.65	$ 2.66	$ 2.66	$ 2.66	$ 2.66	$ 2.67	$ 2.67	$ 2.67
Auxiliary Energy Required Heating [GJ/yr]	147.9	149.2	148.8	148.8	147.9	149.2	145.4	146.5	147.9	148.8
Annual Energy DHW [GJ/yr]	16.2	9.3	9.3	9.3	14.7	16.2	16.2	16.2	13.7	8.6
Annual Energy Space Heating [GJ/yr]	82.1	82.8	82.5	82.6	82.1	83.1	80.8	81.4	82.1	82.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	128.9	122.8	122.4	122.6	127.4	129.6	127.6	128.2	126.4	121.8
Design Heating Load [W]	21361.2	21327.5	21204.8	21368.2	21361.2	21573.6	21136.7	21149.7	21361.2	21327.5
Annual Energy Electricity [kWh/yr]	31301.5	34103	34003.7	34051.1	31303.3	31519.9	30958.2	31121	31304.5	33839.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,365.85	$ 4,762.26	$ 4,748.21	$ 4,754.92	$ 4,366.1	$ 4,396.75	$ 4,317.27	$ 4,340.31	$ 4,366.27	$ 4,724.95
Annual Energy Natural Gas [m3/yr]	434.1	0	0	0	393.7	434.1	434.1	434.1	366.8	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$.	$.	$.	$ 169.83	$ 187.26	$ 187.26	$ 187.26	$ 158.22	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	96241	96496	98422	98224	96242	90661	96259	96457	96243	96497
Upgrade Package List	Pkg3321201052	Pkg3321202054	Pkg3331202053	Pkg3331201054	Pkg3321201052	Pkg3321202054	Pkg3321201053	Pkg3321202052	Pkg3321201052	Pkg3321202054
GHGI [kg/m2]	2.3	0.73	0.73	0.73	2.15	2.31	2.29	2.3	2.05	0.73
% ICC	4.1%	4.3%	4.3%	4.3%	4.1%	4.1%	4.1%	4.1%	4.2%	4.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	80.4	81.1	80.9	80.9	80.4	81.1	79.1	79.7	80.4	80.9
Output: MEUI [kWh/(m2 * yr)]	55.8	52.5	52.3	52.4	55	56.3	55.1	55.5	54.5	52
Output: Better than ERS (%)	5550.0%	5780.0%	5790.0%	5780.0%	5600.0%	5520.0%	5590.0%	5570.0%	5630.0%	5810.0%
Output: Better than Envelope (%)	2070.0%	2000.0%	2020.0%	2020.0%	2070.0%	2000.0%	2200.0%	2140.0%	2070.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	21556	24358	24258	24306	21558	21775	21213	21376	21559	24094
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,039.42	$ 3,434.44	$ 3,420.43	$ 3,427.12	$ 3,039.68	$ 3,070.22	$ 2,991.02	$ 3,013.97	$ 3,039.85	$ 3,397.25
Annual savings in carbon tax for electricity [$/year]	$ 10.78	$ 12.18	$ 12.13	$ 12.15	$ 10.78	$ 10.89	$ 10.61	$ 10.69	$ 10.78	$ 12.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,050.2	$ 3,446.61	$ 3,432.56	$ 3,439.27	$ 3,050.46	$ 3,081.11	$ 3,001.63	$ 3,024.66	$ 3,050.63	$ 3,409.3
Annual savings in GHG from electricity savings [kg CO2e/year]	237.1	267.9	266.8	267.4	237.1	239.5	233.3	235.1	237.2	265
Annual savings in natural gas [m3/year]	344.37	360.54	360.54	360.54	345.87	344.37	344.37	344.37	346.87	360.54
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,190.55	$ 3,340.4	$ 3,340.4	$ 3,340.4	$ 3,204.49	$ 3,190.55	$ 3,190.55	$ 3,190.55	$ 3,213.78	$ 3,340.4
Annual savings in carbon tax for natural gas [$/year]	$ 796.35	$ 833.75	$ 833.75	$ 833.75	$ 799.83	$ 796.35	$ 796.35	$ 796.35	$ 802.14	$ 833.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,986.89	$ 4,174.15	$ 4,174.15	$ 4,174.15	$ 4,004.32	$ 3,986.89	$ 3,986.89	$ 3,986.89	$ 4,015.92	$ 4,174.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	17696.6	18527.7	18527.7	18527.7	17773.9	17696.6	17696.6	17696.6	17825.4	18527.7
Net Present Value [$]	$ 24,163.18	$ 29,915.1	$ 29,838.59	$ 29,999.24	$ 24,379.68	$ 25,068.96	$ 23,719.47	$ 24,160.	$ 24,457.37	$ 29,786.07
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.

LARGE 023WWR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 49,191.39	$ 49,830.39	$ 50,292.75	$ 50,492.75	$ 50,792.75	$ 50,931.75	$ 51,131.75	$ 51,431.75	$ 51,566.75	$ 51,266.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 73,885.47	$ 74,845.25	$ 75,539.71	$ 75,840.11	$ 76,290.71	$ 76,499.49	$ 76,799.89	$ 77,250.49	$ 77,453.26	$ 77,002.66
Net Present Value [$]	$ 1,355.11	$ 716.11	$ 236.64	$ 114.59	$ 37.39	$ 402.36	$ 524.41	$ 601.61	$ 4,762.82	$ 4,896.2
Incremental dollars per GHG saving	$ 4.58	$ 4.64	$ 4.69	$ 4.7	$ 4.71	$ 4.75	$ 4.76	$ 4.77	$ 4.62	$ 4.59
Auxiliary Energy Required Heating [GJ/yr]	133	133	133	131.8	131.8	133	131.8	131.8	137.3	137.6
Annual Energy DHW [GJ/yr]	13.7	13.7	13.7	14.7	13.7	13.7	14.7	13.7	8	8.5
Annual Energy Space Heating [GJ/yr]	140.8	140.8	140.9	139.6	139.6	140.9	139.6	139.6	145.5	145.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	181.9	181.9	182	181.7	180.7	182	181.7	180.7	180.9	181.7
Design Heating Load [W]	19294.3	19294.3	19223.7	19175.6	19175.6	19223.7	19175.6	19175.6	19606.2	19606.2
Annual Energy Electricity [kWh/yr]	8319.2	8319.2	8319.6	8313.1	8313.2	8319.6	8313.1	8313.2	10568.4	10713.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,113.85	$ 1,113.85	$ 1,113.91	$ 1,112.99	$ 1,113.	$ 1,113.91	$ 1,112.99	$ 1,113.	$ 1,432.11	$ 1,452.63
Annual Energy Natural Gas [m3/yr]	4080.4	4080.4	4082.3	4075	4048.4	4082.3	4075	4048.4	3835.9	3843.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,760.14	$ 1,760.14	$ 1,760.96	$ 1,757.81	$ 1,746.34	$ 1,760.96	$ 1,757.81	$ 1,746.34	$ 1,654.67	$ 1,657.78
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	104496	104784	105054	105071	105072	105342	105359	105360	105075	105074
Upgrade Package List	Pkg4331303054	Pkg4331403054	Pkg4341303053	Pkg4341303054	Pkg4341303054	Pkg4341403053	Pkg4341403054	Pkg4341403054	Pkg4341403054	Pkg4341303054
GHGI [kg/m2]	15.47	15.47	15.48	15.45	15.35	15.48	15.45	15.35	14.6	14.63
% ICC	4.4%	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%	4.6%	4.6%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	72.3	72.3	72.3	71.6	71.6	72.3	71.6	71.6	74.7	74.8
Output: MEUI [kWh/(m2 * yr)]	85	85	85	84.8	84.3	85	84.8	84.3	84.4	84.8
Output: Better than ERS (%)	3900.0%	3900.0%	3900.0%	3910.0%	3940.0%	3900.0%	3910.0%	3940.0%	3970.0%	3940.0%
Output: Better than Envelope (%)	2860.0%	2860.0%	2860.0%	2930.0%	2930.0%	2860.0%	2930.0%	2930.0%	2630.0%	2620.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1426	1426	1426	1432	1432	1426	1432	1432	823	968
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 201.08	$ 201.08	$ 201.02	$ 201.94	$ 201.93	$ 201.02	$ 201.94	$ 201.93	$ 116.06	$ 136.5
Annual savings in carbon tax for electricity [$/year]	$ .71	$ .71	$ .71	$ .72	$ .72	$ .71	$ .72	$ .72	$ .41	$ .48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 201.79	$ 201.79	$ 201.74	$ 202.66	$ 202.64	$ 201.74	$ 202.66	$ 202.64	$ 116.47	$ 136.99
Annual savings in GHG from electricity savings [kg CO2e/year]	15.7	15.7	15.7	15.8	15.8	15.7	15.8	15.8	9.1	10.6
Annual savings in natural gas [m3/year]	208.51	208.51	208.44	208.71	209.7	208.44	208.71	209.7	217.62	217.35
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,931.83	$ 1,931.83	$ 1,931.17	$ 1,933.69	$ 1,942.88	$ 1,931.17	$ 1,933.69	$ 1,942.88	$ 2,016.23	$ 2,013.75
Annual savings in carbon tax for natural gas [$/year]	$ 482.18	$ 482.18	$ 482.01	$ 482.64	$ 484.93	$ 482.01	$ 482.64	$ 484.93	$ 503.24	$ 502.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,414.01	$ 2,414.01	$ 2,413.19	$ 2,416.34	$ 2,427.81	$ 2,413.19	$ 2,416.34	$ 2,427.81	$ 2,519.47	$ 2,516.37
Annual savings in GHG from natural gas savings [kg CO2e/year]	10715	10715	10711.4	10725.4	10776.3	10711.4	10725.4	10776.3	11183.2	11169.4
Net Present Value [$]	$ 1,355.11	$ 716.11	$ 236.64	$ 114.59	$ 37.39	$ 402.36	$ 524.41	$ 601.61	$ 4,762.82	$ 4,896.2
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,774.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.

LARGE 023WWR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 20,721.28	$ 20,960.57	$ 21,182.78	$ 21,221.28	$ 21,271.28	$ 21,321.28	$ 21,400.57	$ 21,422.07	$ 21,510.57	$ 21,571.28
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,123.36	$ 31,482.78	$ 31,816.54	$ 31,874.36	$ 31,949.46	$ 32,024.56	$ 32,143.66	$ 32,175.95	$ 32,308.88	$ 32,400.06
Net Present Value [$]	$ 21,195.11	$ 20,750.68	$ 21,095.88	$ 20,980.39	$ 21,055.42	$ 22,873.45	$ 20,985.18	$ 20,651.88	$ 20,611.24	$ 21,028.4
Incremental dollars per GHG saving	$ 2.35	$ 2.39	$ 2.38	$ 2.39	$ 2.39	$ 2.28	$ 2.4	$ 2.42	$ 2.43	$ 2.4
Auxiliary Energy Required Heating [GJ/yr]	206.2	207	204.7	205	206.2	207	204.3	205.5	207	206.2
Annual Energy DHW [GJ/yr]	27.5	27.5	27.5	27.6	25.7	16.5	27.5	27.5	25.7	24.5
Annual Energy Space Heating [GJ/yr]	218.4	219.3	216.8	217.1	218.4	219.3	216.4	217.7	219.3	218.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	273.3	274.2	271.8	272.1	271.5	263.2	271.3	272.7	272.4	270.3
Design Heating Load [W]	25931.7	25993.7	25709.8	25881.2	25931.7	25442	25758.2	25771.9	25993.7	25931.7
Annual Energy Electricity [kWh/yr]	8706.3	8710.8	8698.6	8700.2	8706.3	8710.8	8696.4	8703	8710.8	8706.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,168.63	$ 1,169.26	$ 1,167.54	$ 1,167.76	$ 1,168.63	$ 1,169.26	$ 1,167.23	$ 1,168.16	$ 1,169.26	$ 1,168.63
Annual Energy Natural Gas [m3/yr]	6498	6521.1	6457.1	6465.8	6449	6224.6	6445	6480.2	6472.1	6416.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,803.01	$ 2,812.98	$ 2,785.37	$ 2,789.12	$ 2,781.87	$ 2,685.08	$ 2,780.15	$ 2,795.33	$ 2,791.84	$ 2,767.81
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	193771	195697	193987	193789	193772	193774	195715	195913	195698	193773
Upgrade Package List	Pkg3221201033	Pkg3231201032	Pkg3221202033	Pkg3221201034	Pkg3221201033	Pkg3221201033	Pkg3231201033	Pkg3231202032	Pkg3231201032	Pkg3221201033
GHGI [kg/m2]	24.54	24.62	24.38	24.41	24.35	23.51	24.34	24.47	24.44	24.23
% ICC	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	112.1	112.5	111.3	111.4	112.1	112.5	111	111.7	112.5	112.1
Output: MEUI [kWh/(m2 * yr)]	134.7	135.1	133.8	134	133.7	129.1	133.6	134.3	134.1	133
Output: Better than ERS (%)	2160.0%	2130.0%	2200.0%	2190.0%	2210.0%	2280.0%	2220.0%	2180.0%	2190.0%	2250.0%
Output: Better than Envelope (%)	400.0%	370.0%	470.0%	460.0%	400.0%	370.0%	490.0%	440.0%	370.0%	400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1320	1316	1328	1326	1320	1316	1330	1324	1316	1320
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 186.16	$ 185.53	$ 187.25	$ 187.02	$ 186.16	$ 185.53	$ 187.56	$ 186.63	$ 185.53	$ 186.16
Annual savings in carbon tax for electricity [$/year]	$ .66	$ .66	$ .66	$ .66	$ .66	$ .66	$ .67	$ .66	$ .66	$ .66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 186.82	$ 186.19	$ 187.91	$ 187.69	$ 186.82	$ 186.19	$ 188.22	$ 187.29	$ 186.19	$ 186.82
Annual savings in GHG from electricity savings [kg CO2e/year]	14.5	14.5	14.6	14.6	14.5	14.5	14.6	14.6	14.5	14.5
Annual savings in natural gas [m3/year]	171.33	170.47	172.86	172.53	173.16	181.52	173.31	171.99	172.3	174.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,587.39	$ 1,579.41	$ 1,601.5	$ 1,598.5	$ 1,604.3	$ 1,681.76	$ 1,605.68	$ 1,593.53	$ 1,596.33	$ 1,615.55
Annual savings in carbon tax for natural gas [$/year]	$ 396.2	$ 394.21	$ 399.73	$ 398.98	$ 400.43	$ 419.76	$ 400.77	$ 397.74	$ 398.44	$ 403.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,983.59	$ 1,973.62	$ 2,001.23	$ 1,997.48	$ 2,004.73	$ 2,101.52	$ 2,006.45	$ 1,991.27	$ 1,994.76	$ 2,018.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	8804.5	8760.3	8882.8	8866.2	8898.4	9328	8906	8838.6	8854.1	8960.8
Net Present Value [$]	$ 21,195.11	$ 20,750.68	$ 21,095.88	$ 20,980.39	$ 21,055.42	$ 22,873.45	$ 20,985.18	$ 20,651.88	$ 20,611.24	$ 21,028.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 1,173.75	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.

LARGE 023WWR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>DHWR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,471.28	$ 23,871.28	$ 23,892.78	$ 24,110.57	$ 24,932.78	$ 25,021.28	$ 24,971.28	$ 24,421.28	$ 24,332.78	$ 24,442.78
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 36,755.86	$ 35,854.66	$ 35,886.96	$ 36,214.08	$ 37,449.04	$ 37,581.96	$ 37,506.86	$ 36,680.76	$ 36,547.84	$ 36,713.06
Net Present Value [$]	$ 23,611.99	$ 25,667.12	$ 26,218.24	$ 26,250.05	$ 23,475.89	$ 23,816.54	$ 23,790.27	$ 25,806.56	$ 25,532.66	$ 26,357.93
Incremental dollars per GHG saving	$ 1.22	$ 1.23	$ 1.23	$ 1.24	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25
Auxiliary Energy Required Heating [GJ/yr]	206.5	205.7	207	206.6	205	206.5	205.3	205.7	204.2	207
Annual Energy DHW [GJ/yr]	16.5	27.6	27.6	27.6	16.5	14.9	16.5	25.8	27.6	25.8
Annual Energy Space Heating [GJ/yr]	130.5	130.7	131.5	131.2	129.7	130.5	130	130.7	129.9	131.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	176.2	187.5	188.2	188	175.3	174.6	175.7	185.7	186.7	186.4
Design Heating Load [W]	25540.5	26032.1	26045.8	26094.2	25318.6	25540.5	25490	26032.1	25810.3	26045.8
Annual Energy Electricity [kWh/yr]	44356	44417.8	44623.9	44553	44123.9	44358.2	44231.1	44417.8	44186.3	44623.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,213.06	$ 6,221.8	$ 6,250.97	$ 6,240.93	$ 6,180.22	$ 6,213.37	$ 6,195.39	$ 6,221.8	$ 6,189.05	$ 6,250.97
Annual Energy Natural Gas [m3/yr]	442.6	740.6	740.5	740.1	442.6	400.7	442.6	691.6	740.6	691.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 319.47	$ 319.43	$ 319.25	$ 190.92	$ 172.85	$ 190.92	$ 298.33	$ 319.47	$ 298.29
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	193783	193780	193978	195706	193999	193784	193801	193781	193996	193979
Upgrade Package List	Pkg3221201033	Pkg3221201033	Pkg3221202032	Pkg3231201032	Pkg3221202033	Pkg3221201033	Pkg3221201034	Pkg3221201033	Pkg3221202033	Pkg3221202032
GHGI [kg/m2]	2.61	3.73	3.74	3.73	2.61	2.46	2.61	3.55	3.73	3.55
% ICC	2.2%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	112.3	111.8	112.5	112.3	111.5	112.3	111.6	111.8	111	112.5
Output: MEUI [kWh/(m2 * yr)]	81.7	87.8	88.2	88.1	81.2	80.8	81.4	86.8	87.4	87.2
Output: Better than ERS (%)	4650.0%	4430.0%	4410.0%	4420.0%	4680.0%	4700.0%	4660.0%	4490.0%	4460.0%	4470.0%
Output: Better than Envelope (%)	390.0%	430.0%	370.0%	390.0%	460.0%	390.0%	450.0%	430.0%	500.0%	370.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	34329	34391	34597	34526	34097	34332	34204	34391	34160	34597
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,840.45	$ 4,849.16	$ 4,878.22	$ 4,868.22	$ 4,807.72	$ 4,840.76	$ 4,822.83	$ 4,849.16	$ 4,816.52	$ 4,878.22
Annual savings in carbon tax for electricity [$/year]	$ 17.16	$ 17.2	$ 17.3	$ 17.26	$ 17.05	$ 17.17	$ 17.1	$ 17.2	$ 17.08	$ 17.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,857.61	$ 4,866.35	$ 4,895.52	$ 4,885.49	$ 4,824.77	$ 4,857.92	$ 4,839.94	$ 4,866.35	$ 4,833.6	$ 4,895.52
Annual savings in GHG from electricity savings [kg CO2e/year]	377.6	378.3	380.6	379.8	375.1	377.6	376.2	378.3	375.8	380.6
Annual savings in natural gas [m3/year]	396.95	385.85	385.85	385.86	396.95	398.51	396.95	387.67	385.85	387.68
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,677.73	$ 3,574.86	$ 3,574.9	$ 3,575.04	$ 3,677.73	$ 3,692.2	$ 3,677.73	$ 3,591.78	$ 3,574.86	$ 3,591.81
Annual savings in carbon tax for natural gas [$/year]	$ 917.94	$ 892.27	$ 892.28	$ 892.31	$ 917.94	$ 921.55	$ 917.94	$ 896.49	$ 892.27	$ 896.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,595.68	$ 4,467.13	$ 4,467.17	$ 4,467.35	$ 4,595.68	$ 4,613.75	$ 4,595.68	$ 4,488.27	$ 4,467.13	$ 4,488.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	20398.8	19828.2	19828.4	19829.2	20398.8	20479	20398.8	19922	19828.2	19922.2
Net Present Value [$]	$ 23,611.99	$ 25,667.12	$ 26,218.24	$ 26,250.05	$ 23,475.89	$ 23,816.54	$ 23,790.27	$ 25,806.56	$ 25,532.66	$ 26,357.93
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31	$ 8,216.31
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 550.

LARGE 023WWR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 23,058.65	$ 25,514.15	$ 23,520.15	$ 23,608.65	$ 23,558.65	$ 23,737.94	$ 26,064.15	$ 26,014.15	$ 22,618.65	$ 26,193.44
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,634.09	$ 38,322.25	$ 35,327.27	$ 35,460.19	$ 35,385.09	$ 35,654.39	$ 39,148.35	$ 39,073.25	$ 33,973.21	$ 39,342.55
Net Present Value [$]	$ 23,401.53	$ 23,378.21	$ 23,302.73	$ 23,197.55	$ 23,189.67	$ 23,185.96	$ 23,174.77	$ 23,167.13	$ 23,165.34	$ 23,165.13
Incremental dollars per GHG saving	$ 2.35	$ 2.46	$ 2.37	$ 2.38	$ 2.38	$ 2.39	$ 2.5	$ 2.5	$ 2.34	$ 2.5
Auxiliary Energy Required Heating [GJ/yr]	197.9	188	196.4	197.9	196.7	196	188	186.9	200.6	186.1
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	16.5	16.5	14.9	16.5	16.5	16.5
Annual Energy Space Heating [GJ/yr]	209.6	199.2	208	209.6	208.3	207.6	199.2	197.9	212.5	197.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	253.5	243.1	251.9	251.9	252.2	251.5	241.5	241.8	256.4	241.1
Design Heating Load [W]	24532.1	23011	24310.3	24532.1	24481.7	24358.6	23011	22960.6	24767.7	22837.5
Annual Energy Electricity [kWh/yr]	8662.5	8610.5	8654.7	8662.5	8656.3	8652.5	8610.6	8604.4	8676.9	8600.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,162.43	$ 1,155.07	$ 1,161.33	$ 1,162.43	$ 1,161.55	$ 1,161.01	$ 1,155.08	$ 1,154.21	$ 1,164.47	$ 1,153.67
Annual Energy Natural Gas [m3/yr]	5969	5694.6	5928.1	5927.7	5936.5	5916.7	5653.2	5662	6045.3	5642
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,574.82	$ 2,456.45	$ 2,557.18	$ 2,557.	$ 2,560.8	$ 2,552.26	$ 2,438.59	$ 2,442.39	$ 2,607.73	$ 2,433.76
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	201550	209092	201766	201551	201568	203494	209093	209110	201532	209668
Upgrade Package List	Pkg3321201033	Pkg4321302033	Pkg3321202033	Pkg3321201033	Pkg3321201034	Pkg3331201033	Pkg4321302033	Pkg4321302034	Pkg3321201032	Pkg4331302033
GHGI [kg/m2]	22.55	21.52	22.4	22.4	22.43	22.36	21.37	21.4	22.84	21.33
% ICC	2.0%	2.3%	2.1%	2.1%	2.1%	2.1%	2.3%	2.3%	2.0%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	107.6	102.2	106.8	107.6	106.9	106.5	102.2	101.6	109	101.2
Output: MEUI [kWh/(m2 * yr)]	123.9	118.2	123	123	123.2	122.8	117.4	117.5	125.4	117.1
Output: Better than ERS (%)	2570.0%	2870.0%	2620.0%	2620.0%	2610.0%	2630.0%	2920.0%	2910.0%	2480.0%	2930.0%
Output: Better than Envelope (%)	790.0%	1250.0%	860.0%	790.0%	850.0%	880.0%	1250.0%	1300.0%	670.0%	1340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1364	1416	1372	1364	1370	1374	1416	1422	1350	1426
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 192.34	$ 199.67	$ 193.44	$ 192.34	$ 193.21	$ 193.75	$ 199.66	$ 200.53	$ 190.31	$ 201.07
Annual savings in carbon tax for electricity [$/year]	$ .68	$ .71	$ .69	$ .68	$ .69	$ .69	$ .71	$ .71	$ .67	$ .71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 193.02	$ 200.38	$ 194.12	$ 193.02	$ 193.9	$ 194.44	$ 200.36	$ 201.24	$ 190.98	$ 201.78
Annual savings in GHG from electricity savings [kg CO2e/year]	15	15.6	15.1	15	15.1	15.1	15.6	15.6	14.8	15.7
Annual savings in natural gas [m3/year]	191.04	201.27	192.57	192.58	192.25	192.99	202.81	202.48	188.2	203.23
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,770.	$ 1,864.72	$ 1,784.12	$ 1,784.26	$ 1,781.22	$ 1,788.05	$ 1,879.01	$ 1,875.98	$ 1,743.66	$ 1,882.88
Annual savings in carbon tax for natural gas [$/year]	$ 441.78	$ 465.43	$ 445.31	$ 445.34	$ 444.58	$ 446.29	$ 468.99	$ 468.23	$ 435.21	$ 469.96
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,211.78	$ 2,330.15	$ 2,229.42	$ 2,229.6	$ 2,225.8	$ 2,234.34	$ 2,348.01	$ 2,344.21	$ 2,178.87	$ 2,352.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	9817.4	10342.8	9895.7	9896.5	9879.6	9917.5	10422.1	10405.2	9671.3	10443.5
Net Present Value [$]	$ 23,401.53	$ 23,378.21	$ 23,302.73	$ 23,197.55	$ 23,189.67	$ 23,185.96	$ 23,174.77	$ 23,167.13	$ 23,165.34	$ 23,165.13
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76	$ 4,679.76
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 4,135.75	$ 4,135.75	$ 3,141.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$.	$.	$.

LARGE 023WWR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 45,925.35	$ 46,386.85	$ 46,425.35	$ 46,475.35	$ 46,604.64	$ 46,626.14	$ 46,643.48	$ 46,775.35	$ 46,886.85	$ 46,919.35
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 68,979.88	$ 69,673.05	$ 69,730.88	$ 69,805.98	$ 70,000.17	$ 70,032.46	$ 70,058.51	$ 70,256.58	$ 70,424.05	$ 70,472.86
Net Present Value [$]	$ 33,396.77	$ 33,280.76	$ 33,583.51	$ 33,536.46	$ 33,307.69	$ 33,854.07	$ 33,153.36	$ 33,563.24	$ 33,466.22	$ 34,390.77
Incremental dollars per GHG saving	$ 2.35	$ 2.38	$ 2.38	$ 2.37	$ 2.39	$ 2.39	$ 2.39	$ 2.38	$ 2.4	$ 2.41
Auxiliary Energy Required Heating [GJ/yr]	171.6	170.1	170.4	171.6	169.8	171	170.7	171.6	169	171.6
Annual Energy DHW [GJ/yr]	27.6	27.6	27.6	25.8	27.6	27.6	27.6	24.6	27.6	27.6
Annual Energy Space Heating [GJ/yr]	110.2	109.4	109.8	110.2	109.1	109.9	109.1	110.2	108.9	110.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	167.5	166.7	167	165.6	166.4	167.1	166.1	164.4	166.2	167.5
Design Heating Load [W]	22701.6	22479.7	22651.1	22701.6	22528.1	22541.7	22064.2	22701.6	22429.2	22701.6
Annual Energy Electricity [kWh/yr]	38852.1	38627.5	38729.8	38852.1	38554.6	38758.9	38479.3	38852.1	38504.7	38852.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,434.26	$ 5,402.48	$ 5,416.95	$ 5,434.26	$ 5,392.16	$ 5,421.07	$ 5,381.51	$ 5,434.26	$ 5,385.1	$ 5,434.26
Annual Energy Natural Gas [m3/yr]	741.1	741.2	741.3	692.1	740.8	740.7	740.9	659.5	741.4	741.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.68	$ 319.73	$ 319.77	$ 298.55	$ 319.56	$ 319.51	$ 319.6	$ 284.49	$ 319.81	$ 319.68
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	201664	201880	201682	201665	203608	203806	207442	201666	201898	202312
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3331201053	Pkg3331202052	Pkg4221302053	Pkg3321201053	Pkg3321202054	Pkg3321301053
GHGI [kg/m2]	3.61	3.61	3.61	3.43	3.61	3.61	3.6	3.31	3.61	3.61
% ICC	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.2%	4.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	93.3	92.5	92.7	93.3	92.3	93	92.8	93.3	91.9	93.3
Output: MEUI [kWh/(m2 * yr)]	76.9	76.5	76.7	75.9	76.3	76.7	76.2	75.2	76.2	76.9
Output: Better than ERS (%)	5030.0%	5050.0%	5040.0%	5080.0%	5060.0%	5040.0%	5070.0%	5120.0%	5070.0%	5030.0%
Output: Better than Envelope (%)	2010.0%	2080.0%	2070.0%	2010.0%	2100.0%	2040.0%	2060.0%	2010.0%	2140.0%	2010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28826	28601	28703	28826	28528	28732	28453	28826	28478	28826
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,064.4	$ 4,032.73	$ 4,047.15	$ 4,064.4	$ 4,022.45	$ 4,051.25	$ 4,011.83	$ 4,064.4	$ 4,015.41	$ 4,064.4
Annual savings in carbon tax for electricity [$/year]	$ 14.41	$ 14.3	$ 14.35	$ 14.41	$ 14.26	$ 14.37	$ 14.23	$ 14.41	$ 14.24	$ 14.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,078.81	$ 4,047.03	$ 4,061.5	$ 4,078.81	$ 4,036.71	$ 4,065.62	$ 4,026.06	$ 4,078.81	$ 4,029.65	$ 4,078.81
Annual savings in GHG from electricity savings [kg CO2e/year]	317.1	314.6	315.7	317.1	313.8	316.1	313	317.1	313.3	317.1
Annual savings in natural gas [m3/year]	385.83	385.82	385.82	387.65	385.84	385.84	385.83	388.87	385.82	385.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,574.69	$ 3,574.66	$ 3,574.62	$ 3,591.6	$ 3,574.79	$ 3,574.83	$ 3,574.76	$ 3,602.86	$ 3,574.59	$ 3,574.69
Annual savings in carbon tax for natural gas [$/year]	$ 892.23	$ 892.22	$ 892.21	$ 896.45	$ 892.25	$ 892.26	$ 892.24	$ 899.26	$ 892.2	$ 892.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,466.92	$ 4,466.87	$ 4,466.83	$ 4,488.05	$ 4,467.04	$ 4,467.09	$ 4,467.	$ 4,502.11	$ 4,466.79	$ 4,466.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	19827.2	19827	19826.9	19921.1	19827.8	19828	19827.6	19983.5	19826.7	19827.2
Net Present Value [$]	$ 33,396.77	$ 33,280.76	$ 33,583.51	$ 33,536.46	$ 33,307.69	$ 33,854.07	$ 33,153.36	$ 33,563.24	$ 33,466.22	$ 34,390.77
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$.	$.

LARGE 023WWR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 46,986.85	$ 47,025.35	$ 47,204.64	$ 47,226.14	$ 47,243.48	$ 45,925.35	$ 47,536.85	$ 47,575.35	$ 47,486.85	$ 47,836.85
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 70,574.25	$ 70,632.08	$ 70,901.37	$ 70,933.66	$ 70,959.71	$ 68,979.88	$ 71,400.35	$ 71,458.18	$ 71,325.25	$ 71,850.95
Net Present Value [$]	$ 31,197.22	$ 31,503.02	$ 31,234.98	$ 31,781.78	$ 31,173.76	$ 33,396.77	$ 31,401.59	$ 31,707.57	$ 31,379.34	$ 31,472.36
Incremental dollars per GHG saving	$ 2.34	$ 2.34	$ 2.35	$ 2.35	$ 2.35	$ 2.35	$ 2.36	$ 2.36	$ 2.36	$ 2.37
Auxiliary Energy Required Heating [GJ/yr]	170.9	171.2	170.5	171.8	171.7	171.6	170.9	171.2	169.8	170.9
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	16.5	27.6	14.9	14.9	16.5	13.9
Annual Energy Space Heating [GJ/yr]	109.1	109.5	108.9	109.6	109	110.2	109.2	109.5	108.7	109.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	155.3	155.7	155	155.8	154.9	167.5	153.7	154.1	154.8	152.7
Design Heating Load [W]	21988	22159.4	22036.4	22050.1	21588.7	22701.6	21988	22159.4	21937.6	21988
Annual Energy Electricity [kWh/yr]	38556.6	38660.4	38486.7	38690.7	38447.8	38852.1	38558.7	38662.6	38433.1	38560.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,392.44	$ 5,407.13	$ 5,382.55	$ 5,411.42	$ 5,377.05	$ 5,434.26	$ 5,392.74	$ 5,407.44	$ 5,374.97	$ 5,392.94
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	442.6	741.1	400.7	400.7	442.6	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 319.68	$ 172.85	$ 172.85	$ 190.92	$ 160.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	201883	201685	203611	203809	207445	201664	201884	201686	201901	201885
Upgrade Package List	Pkg3321202053	Pkg3321201054	Pkg3331201053	Pkg3331202052	Pkg4221302053	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321202054	Pkg3321202053
GHGI [kg/m2]	2.49	2.49	2.49	2.49	2.49	3.61	2.33	2.33	2.49	2.23
% ICC	4.2%	4.2%	4.2%	4.2%	4.2%	4.1%	4.2%	4.2%	4.2%	4.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	92.9	93.1	92.7	93.4	93.3	93.3	92.9	93.1	92.3	92.9
Output: MEUI [kWh/(m2 * yr)]	70.3	70.5	70.1	70.5	70.1	76.9	69.4	69.6	70	68.9
Output: Better than ERS (%)	5280.0%	5270.0%	5290.0%	5270.0%	5300.0%	5030.0%	5330.0%	5320.0%	5300.0%	5360.0%
Output: Better than Envelope (%)	2050.0%	2030.0%	2070.0%	2010.0%	2010.0%	2010.0%	2050.0%	2030.0%	2100.0%	2050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28530	28634	28460	28664	28421	28826	28532	28636	28406	28534
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,022.73	$ 4,037.37	$ 4,012.87	$ 4,041.64	$ 4,007.39	$ 4,064.4	$ 4,023.03	$ 4,037.68	$ 4,005.32	$ 4,023.22
Annual savings in carbon tax for electricity [$/year]	$ 14.26	$ 14.32	$ 14.23	$ 14.33	$ 14.21	$ 14.41	$ 14.27	$ 14.32	$ 14.2	$ 14.27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,036.99	$ 4,051.68	$ 4,027.1	$ 4,055.97	$ 4,021.6	$ 4,078.81	$ 4,037.29	$ 4,051.99	$ 4,019.52	$ 4,037.49
Annual savings in GHG from electricity savings [kg CO2e/year]	313.8	315	313.1	315.3	312.6	317.1	313.9	315	312.5	313.9
Annual savings in natural gas [m3/year]	396.95	396.95	396.95	396.95	396.95	385.83	398.51	398.51	396.95	399.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,677.73	$ 3,677.73	$ 3,677.73	$ 3,677.73	$ 3,677.73	$ 3,574.69	$ 3,692.2	$ 3,692.2	$ 3,677.73	$ 3,701.79
Annual savings in carbon tax for natural gas [$/year]	$ 917.94	$ 917.94	$ 917.94	$ 917.94	$ 917.94	$ 892.23	$ 921.55	$ 921.55	$ 917.94	$ 923.95
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,595.68	$ 4,595.68	$ 4,595.68	$ 4,595.68	$ 4,595.68	$ 4,466.92	$ 4,613.75	$ 4,613.75	$ 4,595.68	$ 4,625.74
Annual savings in GHG from natural gas savings [kg CO2e/year]	20398.8	20398.8	20398.8	20398.8	20398.8	19827.2	20479	20479	20398.8	20532.2
Net Present Value [$]	$ 31,197.22	$ 31,503.02	$ 31,234.98	$ 31,781.78	$ 31,173.76	$ 33,396.77	$ 31,401.59	$ 31,707.57	$ 31,379.34	$ 31,472.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	10.47	8.77	10.47	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 8,216.31	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 494.46	$ 494.46	$ 1,173.75	$ 1,173.75	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46	$ 494.46
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 4,135.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75	$ 3,141.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.

LARGE 023WWR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k	large 023WWR.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 48,891.39	$ 49,191.39	$ 49,461.5	$ 49,530.39	$ 49,830.39	$ 49,992.75	$ 50,292.75	$ 50,100.5	$ 50,492.75	$ 50,792.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 73,434.87	$ 73,885.47	$ 74,291.17	$ 74,394.65	$ 74,845.25	$ 75,089.11	$ 75,539.71	$ 75,250.95	$ 75,840.11	$ 76,290.71
Net Present Value [$]	$ 7,796.29	$ 7,727.53	$ 7,242.94	$ 7,157.29	$ 7,088.53	$ 6,725.93	$ 6,657.17	$ 6,603.94	$ 6,508.6	$ 6,439.84
Incremental dollars per GHG saving	$ 4.06	$ 4.07	$ 4.1	$ 4.11	$ 4.12	$ 4.15	$ 4.15	$ 4.16	$ 4.17	$ 4.17
Auxiliary Energy Required Heating [GJ/yr]	158	158	158.8	158	158	157.8	157.8	158.8	156.7	156.7
Annual Energy DHW [GJ/yr]	14.9	13.9	13.9	14.9	13.9	14.9	13.9	13.9	14.9	13.9
Annual Energy Space Heating [GJ/yr]	167.3	167.3	168.2	167.3	167.3	167.2	167.2	168.2	166	166
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	209.7	208.6	209.5	209.7	208.6	209.5	208.5	209.5	208.3	207.3
Design Heating Load [W]	20232.5	20232.5	20246	20232.5	20232.5	20162.5	20162.5	20246	20112.1	20112.1
Annual Energy Electricity [kWh/yr]	8451.6	8451.6	8456.2	8451.6	8451.6	8450.9	8450.9	8456.2	8444.9	8444.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,132.59	$ 1,132.59	$ 1,133.24	$ 1,132.59	$ 1,132.59	$ 1,132.49	$ 1,132.49	$ 1,133.24	$ 1,131.64	$ 1,131.64
Annual Energy Natural Gas [m3/yr]	4812.8	4785.2	4809.4	4812.8	4785.2	4809.3	4781.7	4809.4	4777.4	4749.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,076.07	$ 2,064.17	$ 2,074.61	$ 2,076.07	$ 2,064.17	$ 2,074.56	$ 2,062.66	$ 2,074.61	$ 2,060.8	$ 2,048.9
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	209903	209904	210336	210191	210192	210461	210462	210624	210479	210480
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4341302054	Pkg4331403054	Pkg4331403054	Pkg4341303053	Pkg4341303053	Pkg4341402054	Pkg4341303054	Pkg4341303054
GHGI [kg/m2]	18.22	18.11	18.2	18.22	18.11	18.2	18.1	18.2	18.08	17.98
% ICC	4.3%	4.4%	4.4%	4.4%	4.4%	4.4%	4.5%	4.4%	4.5%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	85.9	85.9	86.3	85.9	85.9	85.8	85.8	86.3	85.2	85.2
Output: MEUI [kWh/(m2 * yr)]	100	99.5	100	100	99.5	100	99.4	100	99.3	98.8
Output: Better than ERS (%)	3850.0%	3880.0%	3860.0%	3850.0%	3880.0%	3860.0%	3890.0%	3860.0%	3890.0%	3920.0%
Output: Better than Envelope (%)	2650.0%	2650.0%	2610.0%	2650.0%	2650.0%	2660.0%	2660.0%	2610.0%	2710.0%	2710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1575	1575	1570	1575	1575	1576	1576	1570	1582	1582
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 222.08	$ 222.08	$ 221.43	$ 222.08	$ 222.08	$ 222.17	$ 222.17	$ 221.43	$ 223.02	$ 223.02
Annual savings in carbon tax for electricity [$/year]	$ .79	$ .79	$ .79	$ .79	$ .79	$ .79	$ .79	$ .79	$ .79	$ .79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 222.86	$ 222.86	$ 222.21	$ 222.86	$ 222.86	$ 222.96	$ 222.96	$ 222.21	$ 223.81	$ 223.81
Annual savings in GHG from electricity savings [kg CO2e/year]	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.4	17.4
Annual savings in natural gas [m3/year]	234.12	235.15	234.25	234.12	235.15	234.25	235.28	234.25	235.44	236.47
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,169.12	$ 2,178.65	$ 2,170.3	$ 2,169.12	$ 2,178.65	$ 2,170.33	$ 2,179.86	$ 2,170.3	$ 2,181.34	$ 2,190.87
Annual savings in carbon tax for natural gas [$/year]	$ 541.4	$ 543.78	$ 541.7	$ 541.4	$ 543.78	$ 541.7	$ 544.08	$ 541.7	$ 544.45	$ 546.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,710.53	$ 2,722.43	$ 2,711.99	$ 2,710.53	$ 2,722.43	$ 2,712.04	$ 2,723.94	$ 2,711.99	$ 2,725.8	$ 2,737.7
Annual savings in GHG from natural gas savings [kg CO2e/year]	12031.2	12084	12037.7	12031.2	12084	12037.9	12090.7	12037.7	12099	12151.8
Net Present Value [$]	$ 7,796.29	$ 7,727.53	$ 7,242.94	$ 7,157.29	$ 7,088.53	$ 6,725.93	$ 6,657.17	$ 6,603.94	$ 6,508.6	$ 6,439.84
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	10.47	14.09	14.09	14.09	14.09	10.47	14.09	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46	$ 24,996.46
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68	$ 9,953.68
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 1,173.75	$ 1,173.75	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11	$ 2,775.11
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 4,135.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,774.75	$ 4,135.75	$ 4,135.75	$ 4,774.75	$ 4,135.75	$ 4,135.75
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.

LARGE 25SAR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 17,896.57	$ 18,358.07	$ 18,396.57	$ 18,446.57	$ 18,746.57	$ 18,779.97	$ 18,858.07	$ 18,908.07	$ 18,946.57	$ 18,958.07
ICC with multiplier (Van=1.0,this Cz =1)	$ 17,896.57	$ 18,358.07	$ 18,396.57	$ 18,446.57	$ 18,746.57	$ 18,779.97	$ 18,858.07	$ 18,908.07	$ 18,946.57	$ 18,958.07
Net Present Value [$]	$ 5,505.79	$ 5,828.53	$ 4,803.96	$ 5,769.23	$ 5,885.79	$ 6,126.52	$ 5,083.84	$ 6,092.69	$ 5,068.36	$ 4,838.15
Incremental dollars per GHG saving	$ 2.27	$ 2.33	$ 2.33	$ 2.32	$ 2.34	$ 2.38	$ 2.39	$ 2.38	$ 2.38	$ 2.25
Auxiliary Energy Required Heating [GJ/yr]	95.7	95.1	91	95.7	95.7	96.6	90.3	95.1	91	98.3
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	21.6	23.7	23.7	22.5	22.5	13.5
Annual Energy Space Heating [GJ/yr]	33.2	33	31.5	33.2	33.2	33.3	31.3	33	31.5	34
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	84.7	84.5	83	83.4	82.6	84.3	82.8	83.2	81.8	75.3
Design Heating Load [W]	15423.9	15310.4	14615.9	15423.9	15423.9	14615.9	14502.4	15310.4	14615.9	15187.9
Annual Energy Electricity [kWh/yr]	16938.4	16884.5	16471.9	16938.4	16938.4	16837.4	16401	16884.5	16471.9	17162.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,333.47	$ 2,325.84	$ 2,267.46	$ 2,333.47	$ 2,333.47	$ 2,319.18	$ 2,257.43	$ 2,325.84	$ 2,267.46	$ 2,365.18
Annual Energy Natural Gas [m3/yr]	637.4	637.4	637.3	603.2	581.3	637.1	637.4	603.3	603.2	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.95	$ 274.95	$ 274.91	$ 260.2	$ 250.75	$ 274.82	$ 274.95	$ 260.24	$ 260.2	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1738	2008	11458	1739	1740	11404	11728	2009	11459	2011
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg2121101021	Pkg2121102031	Pkg1122102031	Pkg2121101031	Pkg1121102031
GHGI [kg/m2]	2.75	2.75	2.74	2.62	2.54	2.75	2.74	2.62	2.61	1.73
% ICC	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	52	51.7	49.4	52	52	52.5	49.1	51.7	49.4	53.4
Output: MEUI [kWh/(m2 * yr)]	32	31.9	31.1	31.3	30.9	31.9	31	31.2	30.4	26.9
Output: Better than ERS (%)	23090.0%	23010.0%	22420.0%	22580.0%	22270.0%	22930.0%	22340.0%	22500.0%	21950.0%	19410.0%
Output: Better than Envelope (%)	1260.0%	1320.0%	1690.0%	1260.0%	1260.0%	1180.0%	1750.0%	1320.0%	1690.0%	1020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8762	8708	8296	8762	8762	8661	8225	8708	8296	8986
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,235.44	$ 1,227.84	$ 1,169.67	$ 1,235.44	$ 1,235.44	$ 1,221.2	$ 1,159.67	$ 1,227.84	$ 1,169.67	$ 1,267.04
Annual savings in carbon tax for electricity [$/year]	$ 4.38	$ 4.35	$ 4.15	$ 4.38	$ 4.38	$ 4.33	$ 4.11	$ 4.35	$ 4.15	$ 4.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,239.82	$ 1,232.2	$ 1,173.81	$ 1,239.82	$ 1,239.82	$ 1,225.53	$ 1,163.78	$ 1,232.2	$ 1,173.81	$ 1,271.53
Annual savings in GHG from electricity savings [kg CO2e/year]	96.4	95.8	91.3	96.4	96.4	95.3	90.5	95.8	91.3	98.8
Annual savings in natural gas [m3/year]	155.46	155.46	155.46	156.73	157.55	155.47	155.46	156.73	156.73	165.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.29	$ 1,440.29	$ 1,440.33	$ 1,452.1	$ 1,459.66	$ 1,440.4	$ 1,440.29	$ 1,452.07	$ 1,452.1	$ 1,535.33
Annual savings in carbon tax for natural gas [$/year]	$ 359.49	$ 359.49	$ 359.5	$ 362.44	$ 364.32	$ 359.52	$ 359.49	$ 362.43	$ 362.44	$ 383.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.78	$ 1,799.78	$ 1,799.83	$ 1,814.54	$ 1,823.98	$ 1,799.91	$ 1,799.78	$ 1,814.49	$ 1,814.54	$ 1,918.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.7	7988.7	7988.9	8054.2	8096.1	7989.3	7988.7	8054	8054.2	8515.8
Net Present Value [$]	$ 5,505.79	$ 5,828.53	$ 4,803.96	$ 5,769.23	$ 5,885.79	$ 6,126.52	$ 5,083.84	$ 6,092.69	$ 5,068.36	$ 4,838.15
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 4,345.2	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.	$.

LARGE 25SAR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 19,770.57	$ 20,232.07	$ 20,320.57	$ 18,958.07	$ 18,996.57	$ 17,896.57	$ 20,620.57	$ 20,782.07	$ 19,508.07	$ 19,546.57
ICC with multiplier (Van=1.0,this Cz =1)	$ 19,770.57	$ 20,232.07	$ 20,320.57	$ 18,958.07	$ 18,996.57	$ 17,896.57	$ 20,620.57	$ 20,782.07	$ 19,508.07	$ 19,546.57
Net Present Value [$]	$ 8,024.65	$ 8,666.36	$ 8,132.06	$ 4,838.15	$ 3,799.03	$ 5,505.79	$ 8,133.54	$ 8,751.13	$ 5,147.09	$ 4,107.97
Incremental dollars per GHG saving	$ 2.18	$ 2.23	$ 2.24	$ 2.25	$ 2.26	$ 2.27	$ 2.27	$ 2.29	$ 2.3	$ 2.31
Auxiliary Energy Required Heating [GJ/yr]	98.3	97.7	98	98.3	94.2	95.7	97.8	97.4	98.3	94.2
Annual Energy DHW [GJ/yr]	7.8	7.8	7.2	13.5	13.5	23.7	6.9	7.2	12.4	12.4
Annual Energy Space Heating [GJ/yr]	33.8	34.1	33.7	34	32.5	33.2	33.7	34	34	32.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	69.3	69.6	68.7	75.3	73.8	84.7	68.3	68.9	74.2	72.7
Design Heating Load [W]	14615.9	14502.4	14615.9	15187.9	14493.6	15423.9	14615.9	14502.4	15187.9	14493.6
Annual Energy Electricity [kWh/yr]	19262.8	19332.8	19090.9	17162.5	16743.9	16938.4	18974.9	19152.1	17163.5	16744.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,662.37	$ 2,672.28	$ 2,638.05	$ 2,365.18	$ 2,305.95	$ 2,333.47	$ 2,621.63	$ 2,646.71	$ 2,365.32	$ 2,306.09
Annual Energy Natural Gas [m3/yr]	0	0	0	362.1	362.1	637.4	0	0	333	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 156.2	$ 156.2	$ 274.95	$.	$.	$ 143.64	$ 143.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	11734	11465	2011	11461	1738	11466	11735	2012	11462
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg2121101031	Pkg2121102031	Pkg1121102031	Pkg2121101031
GHGI [kg/m2]	0.41	0.42	0.41	1.73	1.72	2.75	0.41	1.62	1.61	1.61
% ICC	1.8%	1.8%	1.8%	1.7%	1.7%	1.6%	1.8%	1.8%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53.5	53.1	53.3	53.4	51.2	52	53.2	52.9	53.5	51.2
Output: MEUI [kWh/(m2 * yr)]	23.7	23.8	23.3	26.9	26.1	32	23.1	23.5	26.3	25.5
Output: Better than ERS (%)	17070.0%	17190.0%	16840.0%	19410.0%	18830.0%	23090.0%	16680.0%	16910.0%	18980.0%	18400.0%
Output: Better than Envelope (%)	1020.0%	1080.0%	1050.0%	1020.0%	1400.0%	1260.0%	1070.0%	1110.0%	1020.0%	1400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	11086	11156	10914	8986	8568	8762	10798	10976	8987	8568
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,563.18	$ 1,573.05	$ 1,538.94	$ 1,267.04	$ 1,208.02	$ 1,235.44	$ 1,522.59	$ 1,547.57	$ 1,267.18	$ 1,208.16
Annual savings in carbon tax for electricity [$/year]	$ 5.54	$ 5.58	$ 5.46	$ 4.49	$ 4.28	$ 4.38	$ 5.4	$ 5.49	$ 4.49	$ 4.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,568.73	$ 1,578.63	$ 1,544.4	$ 1,271.53	$ 1,212.3	$ 1,239.82	$ 1,527.99	$ 1,553.06	$ 1,271.67	$ 1,212.44
Annual savings in GHG from electricity savings [kg CO2e/year]	122	122.7	120.1	98.8	94.2	96.4	118.8	120.7	98.9	94.3
Annual savings in natural gas [m3/year]	179.2	179.2	179.2	165.71	165.71	155.46	179.2	179.2	166.8	166.8
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,660.33	$ 1,660.33	$ 1,660.33	$ 1,535.33	$ 1,535.33	$ 1,440.29	$ 1,660.33	$ 1,660.33	$ 1,545.37	$ 1,545.37
Annual savings in carbon tax for natural gas [$/year]	$ 414.41	$ 414.41	$ 414.41	$ 383.21	$ 383.21	$ 359.49	$ 414.41	$ 414.41	$ 385.72	$ 385.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,074.74	$ 2,074.74	$ 2,074.74	$ 1,918.54	$ 1,918.54	$ 1,799.78	$ 2,074.74	$ 2,074.74	$ 1,931.09	$ 1,931.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	9209.1	9209.1	9209.1	8515.8	8515.8	7988.7	9209.1	9209.1	8571.5	8571.5
Net Present Value [$]	$ 8,024.65	$ 8,666.36	$ 8,132.06	$ 4,838.15	$ 3,799.03	$ 5,505.79	$ 8,133.54	$ 8,751.13	$ 5,147.09	$ 4,107.97
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$.	$ 1,374.	$ 1,374.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.	$ 550.	$ 550.

LARGE 25SAR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,996.57	$ 19,546.57	$ 19,458.07	$ 19,846.57	$ 20,008.07	$ 20,308.07	$ 18,396.57	$ 18,958.07	$ 20,493.11	$ 18,946.57
ICC with multiplier (Van=1.0,this Cz =1)	$ 18,996.57	$ 19,546.57	$ 19,458.07	$ 19,846.57	$ 20,008.07	$ 20,308.07	$ 18,396.57	$ 18,958.07	$ 20,493.11	$ 18,946.57
Net Present Value [$]	$ 3,799.03	$ 4,107.97	$ 4,125.24	$ 4,253.05	$ 4,434.36	$ 4,579.26	$ 4,803.96	$ 4,838.15	$ 4,944.83	$ 5,068.36
Incremental dollars per GHG saving	$ 2.26	$ 2.31	$ 2.31	$ 2.33	$ 2.36	$ 2.39	$ 2.33	$ 2.25	$ 2.43	$ 2.38
Auxiliary Energy Required Heating [GJ/yr]	94.2	94.2	93.6	94.2	93.6	93.6	91	98.3	92.8	91
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	12.4	11.7	23.7	13.5	13.5	22.5
Annual Energy Space Heating [GJ/yr]	32.5	32.5	32.3	32.5	32.3	32.3	31.5	34	32	31.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	73.8	72.7	73.6	72	72.5	71.8	83	75.3	73.3	81.8
Design Heating Load [W]	14493.6	14493.6	14380.1	14493.6	14380.1	14380.1	14615.9	15187.9	14348.6	14615.9
Annual Energy Electricity [kWh/yr]	16743.9	16744.9	16691.4	16745.6	16692.4	16693.1	16471.9	17162.5	16607.7	16471.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,305.95	$ 2,306.09	$ 2,298.52	$ 2,306.19	$ 2,298.66	$ 2,298.76	$ 2,267.46	$ 2,365.18	$ 2,286.67	$ 2,267.46
Annual Energy Natural Gas [m3/yr]	362.1	333	362.1	314.3	333	314.3	637.3	362.1	362.1	603.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 143.64	$ 135.58	$ 274.91	$ 156.2	$ 156.2	$ 260.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11462	11731	11463	11732	11733	11458	2011	13081	11459
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg1121102031	Pkg2131101031	Pkg2121101031
GHGI [kg/m2]	1.72	1.61	1.72	1.54	1.61	1.54	2.74	1.73	1.71	2.61
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.6%	1.7%	1.8%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	51.2	51.2	50.9	51.2	50.9	50.9	49.4	53.4	50.5	49.4
Output: MEUI [kWh/(m2 * yr)]	26.1	25.5	26	25.1	25.4	25	31.1	26.9	25.8	30.4
Output: Better than ERS (%)	18830.0%	18400.0%	18750.0%	18120.0%	18320.0%	18050.0%	22420.0%	19410.0%	18630.0%	21950.0%
Output: Better than Envelope (%)	1400.0%	1400.0%	1450.0%	1400.0%	1450.0%	1450.0%	1690.0%	1020.0%	1530.0%	1690.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8568	8568	8515	8569	8516	8517	8296	8986	8431	8296
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,208.02	$ 1,208.16	$ 1,200.61	$ 1,208.26	$ 1,200.76	$ 1,200.85	$ 1,169.67	$ 1,267.04	$ 1,188.81	$ 1,169.67
Annual savings in carbon tax for electricity [$/year]	$ 4.28	$ 4.28	$ 4.26	$ 4.28	$ 4.26	$ 4.26	$ 4.15	$ 4.49	$ 4.22	$ 4.15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,212.3	$ 1,212.44	$ 1,204.87	$ 1,212.54	$ 1,205.01	$ 1,205.11	$ 1,173.81	$ 1,271.53	$ 1,193.03	$ 1,173.81
Annual savings in GHG from electricity savings [kg CO2e/year]	94.2	94.3	93.7	94.3	93.7	93.7	91.3	98.8	92.7	91.3
Annual savings in natural gas [m3/year]	165.71	166.8	165.71	167.49	166.8	167.49	155.46	165.71	165.71	156.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,535.33	$ 1,545.37	$ 1,535.33	$ 1,551.83	$ 1,545.37	$ 1,551.83	$ 1,440.33	$ 1,535.33	$ 1,535.33	$ 1,452.1
Annual savings in carbon tax for natural gas [$/year]	$ 383.21	$ 385.72	$ 383.21	$ 387.33	$ 385.72	$ 387.33	$ 359.5	$ 383.21	$ 383.21	$ 362.44
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,918.54	$ 1,931.09	$ 1,918.54	$ 1,939.16	$ 1,931.09	$ 1,939.16	$ 1,799.83	$ 1,918.54	$ 1,918.54	$ 1,814.54
Annual savings in GHG from natural gas savings [kg CO2e/year]	8515.8	8571.5	8515.8	8607.3	8571.5	8607.3	7988.9	8515.8	8515.8	8054.2
Net Present Value [$]	$ 3,799.03	$ 4,107.97	$ 4,125.24	$ 4,253.05	$ 4,434.36	$ 4,579.26	$ 4,803.96	$ 4,838.15	$ 4,944.83	$ 5,068.36
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE 25SAR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 20,196.57	$ 20,218.07	$ 20,658.07	$ 20,746.57	$ 20,768.07	$ 21,046.57	$ 21,068.07	$ 21,208.07	$ 21,253.11	$ 21,508.07
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,196.57	$ 20,218.07	$ 20,658.07	$ 20,746.57	$ 20,768.07	$ 21,046.57	$ 21,068.07	$ 21,208.07	$ 21,253.11	$ 21,508.07
Net Present Value [$]	$ 6,134.22	$ 6,280.8	$ 6,413.69	$ 6,398.39	$ 6,544.96	$ 6,514.22	$ 6,661.52	$ 6,677.85	$ 7,103.62	$ 6,794.41
Incremental dollars per GHG saving	$ 2.56	$ 2.56	$ 2.62	$ 2.61	$ 2.61	$ 2.63	$ 2.63	$ 2.66	$ 2.69	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	86.9	87.5	86.3	86.9	87.5	86.9	87.5	86.3	86.7	86.3
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.5	22.5	21.6	21.6	22.5	23.7	21.7
Annual Energy Space Heating [GJ/yr]	30.2	30.4	29.9	30.2	30.4	30.2	30.4	29.9	30.1	29.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	82.4	82.6	82.1	81.1	81.3	80.3	80.5	80.9	82.3	80
Design Heating Load [W]	14092.2	14085	13978.7	14092.2	14085	14092.2	14085	13978.7	14053.4	13978.7
Annual Energy Electricity [kWh/yr]	16289.1	16337.7	16218.4	16289.1	16337.7	16289.1	16337.7	16218.4	16255.9	16218.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,241.59	$ 2,248.47	$ 2,231.59	$ 2,241.59	$ 2,248.47	$ 2,241.59	$ 2,248.47	$ 2,231.59	$ 2,236.89	$ 2,231.59
Annual Energy Natural Gas [m3/yr]	637.4	637.4	637.4	603.3	603.3	581.3	581.4	603.3	637.2	581.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.95	$ 274.95	$ 274.95	$ 260.24	$ 260.24	$ 250.75	$ 250.8	$ 260.24	$ 274.87	$ 250.8
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11494	11746	11764	11495	11747	11496	11748	11765	13096	11766
Upgrade Package List	Pkg2121101033	Pkg2121102032	Pkg2121102033	Pkg2121101033	Pkg2121102032	Pkg2121101033	Pkg2121102032	Pkg2121102033	Pkg2131101032	Pkg2121102033
GHGI [kg/m2]	2.74	2.74	2.74	2.61	2.61	2.53	2.53	2.61	2.74	2.53
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	47.2	47.6	46.9	47.2	47.6	47.2	47.6	46.9	47.1	46.9
Output: MEUI [kWh/(m2 * yr)]	30.8	30.9	30.6	30.1	30.2	29.6	29.7	29.9	30.7	29.5
Output: Better than ERS (%)	22190.0%	22270.0%	22070.0%	21680.0%	21760.0%	21370.0%	21450.0%	21600.0%	22150.0%	21250.0%
Output: Better than Envelope (%)	2060.0%	2010.0%	2120.0%	2060.0%	2010.0%	2060.0%	2010.0%	2120.0%	2080.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8113	8161	8042	8113	8161	8113	8161	8042	8080	8042
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,143.89	$ 1,150.74	$ 1,133.92	$ 1,143.89	$ 1,150.74	$ 1,143.89	$ 1,150.74	$ 1,133.92	$ 1,139.21	$ 1,133.92
Annual savings in carbon tax for electricity [$/year]	$ 4.06	$ 4.08	$ 4.02	$ 4.06	$ 4.08	$ 4.06	$ 4.08	$ 4.02	$ 4.04	$ 4.02
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,147.95	$ 1,154.82	$ 1,137.94	$ 1,147.95	$ 1,154.82	$ 1,147.95	$ 1,154.82	$ 1,137.94	$ 1,143.25	$ 1,137.94
Annual savings in GHG from electricity savings [kg CO2e/year]	89.2	89.8	88.5	89.2	89.8	89.2	89.8	88.5	88.9	88.5
Annual savings in natural gas [m3/year]	155.46	155.46	155.46	156.73	156.73	157.55	157.54	156.73	155.46	157.54
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.29	$ 1,440.29	$ 1,440.29	$ 1,452.07	$ 1,452.07	$ 1,459.66	$ 1,459.63	$ 1,452.07	$ 1,440.36	$ 1,459.63
Annual savings in carbon tax for natural gas [$/year]	$ 359.49	$ 359.49	$ 359.49	$ 362.43	$ 362.43	$ 364.32	$ 364.32	$ 362.43	$ 359.51	$ 364.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.78	$ 1,799.78	$ 1,799.78	$ 1,814.49	$ 1,814.49	$ 1,823.98	$ 1,823.94	$ 1,814.49	$ 1,799.87	$ 1,823.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.7	7988.7	7988.7	8054	8054	8096.1	8095.9	8054	7989.1	8095.9
Net Present Value [$]	$ 6,134.22	$ 6,280.8	$ 6,413.69	$ 6,398.39	$ 6,544.96	$ 6,514.22	$ 6,661.52	$ 6,677.85	$ 7,103.62	$ 6,794.41
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	10.47	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$.	$ 850.

LARGE 25SAR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 20,196.57	$ 20,218.07	$ 20,746.57	$ 20,768.07	$ 20,658.07	$ 21,046.57	$ 21,068.07	$ 21,208.07	$ 21,508.07	$ 21,253.11
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,196.57	$ 20,218.07	$ 20,746.57	$ 20,768.07	$ 20,658.07	$ 21,046.57	$ 21,068.07	$ 21,208.07	$ 21,508.07	$ 21,253.11
Net Present Value [$]	$ 6,134.22	$ 6,280.8	$ 6,398.39	$ 6,544.96	$ 6,413.69	$ 6,514.22	$ 6,661.52	$ 6,677.85	$ 6,794.41	$ 7,103.62
Incremental dollars per GHG saving	$ 2.56	$ 2.56	$ 2.61	$ 2.61	$ 2.62	$ 2.63	$ 2.63	$ 2.66	$ 2.69	$ 2.69
Auxiliary Energy Required Heating [GJ/yr]	86.9	87.5	86.9	87.5	86.3	86.9	87.5	86.3	86.3	86.7
Annual Energy DHW [GJ/yr]	23.7	23.7	22.5	22.5	23.7	21.6	21.6	22.5	21.7	23.7
Annual Energy Space Heating [GJ/yr]	30.2	30.4	30.2	30.4	29.9	30.2	30.4	29.9	29.9	30.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	82.4	82.6	81.1	81.3	82.1	80.3	80.5	80.9	80	82.3
Design Heating Load [W]	14092.2	14085	14092.2	14085	13978.7	14092.2	14085	13978.7	13978.7	14053.4
Annual Energy Electricity [kWh/yr]	16289.1	16337.7	16289.1	16337.7	16218.4	16289.1	16337.7	16218.4	16218.4	16255.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,241.59	$ 2,248.47	$ 2,241.59	$ 2,248.47	$ 2,231.59	$ 2,241.59	$ 2,248.47	$ 2,231.59	$ 2,231.59	$ 2,236.89
Annual Energy Natural Gas [m3/yr]	637.4	637.4	603.3	603.3	637.4	581.3	581.4	603.3	581.4	637.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.95	$ 274.95	$ 260.24	$ 260.24	$ 274.95	$ 250.75	$ 250.8	$ 260.24	$ 250.8	$ 274.87
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11494	11746	11495	11747	11764	11496	11748	11765	11766	13096
Upgrade Package List	Pkg2121101033	Pkg2121102032	Pkg2121101033	Pkg2121102032	Pkg2121102033	Pkg2121101033	Pkg2121102032	Pkg2121102033	Pkg2121102033	Pkg2131101032
GHGI [kg/m2]	2.74	2.74	2.61	2.61	2.74	2.53	2.53	2.61	2.53	2.74
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	47.2	47.6	47.2	47.6	46.9	47.2	47.6	46.9	46.9	47.1
Output: MEUI [kWh/(m2 * yr)]	30.8	30.9	30.1	30.2	30.6	29.6	29.7	29.9	29.5	30.7
Output: Better than ERS (%)	22190.0%	22270.0%	21680.0%	21760.0%	22070.0%	21370.0%	21450.0%	21600.0%	21250.0%	22150.0%
Output: Better than Envelope (%)	2060.0%	2010.0%	2060.0%	2010.0%	2120.0%	2060.0%	2010.0%	2120.0%	2120.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8113	8161	8113	8161	8042	8113	8161	8042	8042	8080
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,143.89	$ 1,150.74	$ 1,143.89	$ 1,150.74	$ 1,133.92	$ 1,143.89	$ 1,150.74	$ 1,133.92	$ 1,133.92	$ 1,139.21
Annual savings in carbon tax for electricity [$/year]	$ 4.06	$ 4.08	$ 4.06	$ 4.08	$ 4.02	$ 4.06	$ 4.08	$ 4.02	$ 4.02	$ 4.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,147.95	$ 1,154.82	$ 1,147.95	$ 1,154.82	$ 1,137.94	$ 1,147.95	$ 1,154.82	$ 1,137.94	$ 1,137.94	$ 1,143.25
Annual savings in GHG from electricity savings [kg CO2e/year]	89.2	89.8	89.2	89.8	88.5	89.2	89.8	88.5	88.5	88.9
Annual savings in natural gas [m3/year]	155.46	155.46	156.73	156.73	155.46	157.55	157.54	156.73	157.54	155.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.29	$ 1,440.29	$ 1,452.07	$ 1,452.07	$ 1,440.29	$ 1,459.66	$ 1,459.63	$ 1,452.07	$ 1,459.63	$ 1,440.36
Annual savings in carbon tax for natural gas [$/year]	$ 359.49	$ 359.49	$ 362.43	$ 362.43	$ 359.49	$ 364.32	$ 364.32	$ 362.43	$ 364.32	$ 359.51
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.78	$ 1,799.78	$ 1,814.49	$ 1,814.49	$ 1,799.78	$ 1,823.98	$ 1,823.94	$ 1,814.49	$ 1,823.94	$ 1,799.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.7	7988.7	8054	8054	7988.7	8096.1	8095.9	8054	8095.9	7989.1
Net Present Value [$]	$ 6,134.22	$ 6,280.8	$ 6,398.39	$ 6,544.96	$ 6,413.69	$ 6,514.22	$ 6,661.52	$ 6,677.85	$ 6,794.41	$ 7,103.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	10.47	8.77	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$ 550.	$ 850.	$.

LARGE 25SAR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,855.05	$ 23,405.05	$ 23,316.55	$ 23,705.05	$ 20,196.57	$ 23,866.55	$ 20,218.07	$ 24,166.55	$ 22,255.05	$ 20,746.57
ICC with multiplier (Van=1.0,this Cz =1)	$ 22,855.05	$ 23,405.05	$ 23,316.55	$ 23,705.05	$ 20,196.57	$ 23,866.55	$ 20,218.07	$ 24,166.55	$ 22,255.05	$ 20,746.57
Net Present Value [$]	$ 5,533.32	$ 5,842.26	$ 5,892.03	$ 5,987.34	$ 6,134.22	$ 6,201.33	$ 6,280.8	$ 6,346.04	$ 6,392.23	$ 6,398.39
Incremental dollars per GHG saving	$ 2.71	$ 2.76	$ 2.77	$ 2.78	$ 2.56	$ 2.81	$ 2.56	$ 2.84	$ 2.82	$ 2.61
Auxiliary Energy Required Heating [GJ/yr]	85.7	85.7	85	85.7	86.9	85	87.5	85	82.4	86.9
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	23.7	12.4	23.7	11.7	23.7	22.5
Annual Energy Space Heating [GJ/yr]	29.6	29.6	29.4	29.6	30.2	29.4	30.4	29.4	28.4	30.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.1	1.8
Total Energy [GJ/yr]	70.8	69.7	70.7	69	82.4	69.6	82.6	68.9	79.9	81.1
Design Heating Load [W]	13515.2	13515.2	13401.8	13515.2	14092.2	13401.8	14085	13401.8	13637.5	14092.2
Annual Energy Electricity [kWh/yr]	15918.8	15919.8	15878.9	15920.5	16289.1	15880	16337.7	15880.6	15589.7	16289.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,189.2	$ 2,189.34	$ 2,183.55	$ 2,189.44	$ 2,241.59	$ 2,183.7	$ 2,248.47	$ 2,183.79	$ 2,142.63	$ 2,241.59
Annual Energy Natural Gas [m3/yr]	362.1	333	362.1	314.3	637.4	333	637.4	314.3	637.4	603.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 156.2	$ 135.58	$ 274.95	$ 143.64	$ 274.95	$ 135.58	$ 274.95	$ 260.24
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	17834	18103	17835	11494	18104	11746	18105	17830	11495
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2121101033	Pkg2221102031	Pkg2121102032	Pkg2221102031	Pkg2221101031	Pkg2121101033
GHGI [kg/m2]	1.7	1.59	1.7	1.52	2.74	1.59	2.74	1.52	2.72	2.61
% ICC	2.0%	2.1%	2.1%	2.1%	1.8%	2.1%	1.8%	2.1%	2.0%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.6	46.6	46.2	46.6	47.2	46.2	47.6	46.2	44.8	47.2
Output: MEUI [kWh/(m2 * yr)]	24.5	23.9	24.4	23.5	30.8	23.8	30.9	23.4	29.4	30.1
Output: Better than ERS (%)	17660.0%	17230.0%	17620.0%	16950.0%	22190.0%	17190.0%	22270.0%	16910.0%	21210.0%	21680.0%
Output: Better than Envelope (%)	2170.0%	2170.0%	2240.0%	2170.0%	2060.0%	2240.0%	2010.0%	2240.0%	2470.0%	2060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7742	7743	7702	7744	8113	7704	8161	7704	7413	8113
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,091.68	$ 1,091.82	$ 1,086.05	$ 1,091.92	$ 1,143.89	$ 1,086.21	$ 1,150.74	$ 1,086.29	$ 1,045.28	$ 1,143.89
Annual savings in carbon tax for electricity [$/year]	$ 3.87	$ 3.87	$ 3.85	$ 3.87	$ 4.06	$ 3.85	$ 4.08	$ 3.85	$ 3.71	$ 4.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,095.55	$ 1,095.69	$ 1,089.9	$ 1,095.79	$ 1,147.95	$ 1,090.06	$ 1,154.82	$ 1,090.14	$ 1,048.98	$ 1,147.95
Annual savings in GHG from electricity savings [kg CO2e/year]	85.2	85.2	84.7	85.2	89.2	84.7	89.8	84.7	81.5	89.2
Annual savings in natural gas [m3/year]	165.71	166.8	165.71	167.49	155.46	166.8	155.46	167.49	155.46	156.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,535.33	$ 1,545.37	$ 1,535.33	$ 1,551.83	$ 1,440.29	$ 1,545.37	$ 1,440.29	$ 1,551.83	$ 1,440.29	$ 1,452.07
Annual savings in carbon tax for natural gas [$/year]	$ 383.21	$ 385.72	$ 383.21	$ 387.33	$ 359.49	$ 385.72	$ 359.49	$ 387.33	$ 359.49	$ 362.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,918.54	$ 1,931.09	$ 1,918.54	$ 1,939.16	$ 1,799.78	$ 1,931.09	$ 1,799.78	$ 1,939.16	$ 1,799.78	$ 1,814.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	8515.8	8571.5	8515.8	8607.3	7988.7	8571.5	7988.7	8607.3	7988.7	8054
Net Present Value [$]	$ 5,533.32	$ 5,842.26	$ 5,892.03	$ 5,987.34	$ 6,134.22	$ 6,201.33	$ 6,280.8	$ 6,346.04	$ 6,392.23	$ 6,398.39
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	10.47	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	5.28	3.87	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 12,164.93	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 60	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,800.	$.	$ 1,360.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.	$ 850.	$.	$ 550.

LARGE 25SAR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,215.91	$ 59,515.91	$ 59,584.56	$ 60,134.56	$ 60,415.81	$ 60,434.56
ICC with multiplier (Van=1.0,this Cz =1)	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,215.91	$ 59,515.91	$ 59,584.56	$ 60,134.56	$ 60,415.81	$ 60,434.56
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 36,889.	$ 37,005.56	$ 37,441.55	$ 37,705.71	$ 38,334.88	$ 37,821.55
Incremental dollars per GHG saving	$ 7.23	$ 7.24	$ 7.24	$ 7.4	$ 7.4	$ 7.4	$ 7.51	$ 7.52	$ 7.62	$ 7.52
Auxiliary Energy Required Heating [GJ/yr]	54.8	54.8	54.8	54.8	54.8	54.8	54.7	54.7	54.6	54.7
Annual Energy DHW [GJ/yr]	23.7	22.5	21.7	23.7	22.5	21.7	23.7	22.5	23.7	21.6
Annual Energy Space Heating [GJ/yr]	19	19	19	19	19	19	18.9	18.9	19	18.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	71.2	70	69.1	71.2	70	69.1	71.1	69.8	71.2	69
Design Heating Load [W]	10224.3	10224.3	10224.3	10224.3	10224.3	10224.3	10190.5	10190.5	10146.6	10190.5
Annual Energy Electricity [kWh/yr]	13189.5	13189.5	13189.5	13189.5	13189.5	13189.5	13150.3	13150.3	13174.1	13150.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,797.45	$ 1,797.45	$ 1,800.82	$ 1,797.45
Annual Energy Natural Gas [m3/yr]	637.6	603.4	581.5	637.6	603.4	581.5	637.4	603.3	637.5	581.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.04	$ 260.29	$ 250.84	$ 275.04	$ 260.29	$ 250.84	$ 274.95	$ 260.24	$ 275.	$ 250.75
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	51797	51798	52084	52085	52086	52228	52229	52354	52230
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4331303054	Pkg4331403054	Pkg4331403054	Pkg4331403054	Pkg4341302054	Pkg4341302054	Pkg4341303053	Pkg4341302054
GHGI [kg/m2]	2.67	2.54	2.46	2.67	2.54	2.46	2.67	2.54	2.67	2.46
% ICC	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7
Output: MEUI [kWh/(m2 * yr)]	24.7	24	23.6	24.7	24	23.6	24.6	23.9	24.7	23.5
Output: Better than ERS (%)	17810.0%	17340.0%	16990.0%	17810.0%	17340.0%	16990.0%	17770.0%	17270.0%	17810.0%	16950.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5010.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5013	5013	5013	5013	5013	5013	4974	4974	4998	4974
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 701.32	$ 701.32	$ 704.68	$ 701.32
Annual savings in carbon tax for electricity [$/year]	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.49	$ 2.49	$ 2.5	$ 2.49
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 703.81	$ 703.81	$ 707.17	$ 703.81
Annual savings in GHG from electricity savings [kg CO2e/year]	55.1	55.1	55.1	55.1	55.1	55.1	54.7	54.7	55	54.7
Annual savings in natural gas [m3/year]	155.45	156.72	157.54	155.45	156.72	157.54	155.46	156.73	155.45	157.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.23	$ 1,452.03	$ 1,459.59	$ 1,440.23	$ 1,452.03	$ 1,459.59	$ 1,440.29	$ 1,452.07	$ 1,440.26	$ 1,459.66
Annual savings in carbon tax for natural gas [$/year]	$ 359.47	$ 362.42	$ 364.31	$ 359.47	$ 362.42	$ 364.31	$ 359.49	$ 362.43	$ 359.48	$ 364.32
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.7	$ 1,814.45	$ 1,823.9	$ 1,799.7	$ 1,814.45	$ 1,823.9	$ 1,799.78	$ 1,814.49	$ 1,799.74	$ 1,823.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.3	8053.8	8095.7	7988.3	8053.8	8095.7	7988.7	8054	7988.5	8096.1
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 36,889.	$ 37,005.56	$ 37,441.55	$ 37,705.71	$ 38,334.88	$ 37,821.55
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	10.47	10.47	14.09	10.47
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 6,113.76	$ 6,113.76	$ 6,113.76	$ 6,113.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 9,549.5	$ 9,549.5	$ 9,549.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.

LARGE 25SAR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USi1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,515.91	$ 59,215.91	$ 59,584.56	$ 60,434.56	$ 60,134.56	$ 60,415.81
ICC with multiplier (Van=1.0,this Cz =1)	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,515.91	$ 59,215.91	$ 59,584.56	$ 60,434.56	$ 60,134.56	$ 60,415.81
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 37,005.56	$ 36,889.	$ 37,441.55	$ 37,821.55	$ 37,705.71	$ 38,334.88
Incremental dollars per GHG saving	$ 7.23	$ 7.24	$ 7.24	$ 7.4	$ 7.4	$ 7.4	$ 7.51	$ 7.52	$ 7.52	$ 7.62
Auxiliary Energy Required Heating [GJ/yr]	54.8	54.8	54.8	54.8	54.8	54.8	54.7	54.7	54.7	54.6
Annual Energy DHW [GJ/yr]	23.7	22.5	21.7	23.7	21.7	22.5	23.7	21.6	22.5	23.7
Annual Energy Space Heating [GJ/yr]	19	19	19	19	19	19	18.9	18.9	18.9	19
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	71.2	70	69.1	71.2	69.1	70	71.1	69	69.8	71.2
Design Heating Load [W]	10224.3	10224.3	10224.3	10224.3	10224.3	10224.3	10190.5	10190.5	10190.5	10146.6
Annual Energy Electricity [kWh/yr]	13189.5	13189.5	13189.5	13189.5	13189.5	13189.5	13150.3	13150.3	13150.3	13174.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,797.45	$ 1,797.45	$ 1,797.45	$ 1,800.82
Annual Energy Natural Gas [m3/yr]	637.6	603.4	581.5	637.6	581.5	603.4	637.4	581.3	603.3	637.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.04	$ 260.29	$ 250.84	$ 275.04	$ 250.84	$ 260.29	$ 274.95	$ 250.75	$ 260.24	$ 275.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	51797	51798	52084	52086	52085	52228	52230	52229	52354
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4331303054	Pkg4331403054	Pkg4331403054	Pkg4331403054	Pkg4341302054	Pkg4341302054	Pkg4341302054	Pkg4341303053
GHGI [kg/m2]	2.67	2.54	2.46	2.67	2.46	2.54	2.67	2.46	2.54	2.67
% ICC	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	5.3%	5.4%	5.3%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7
Output: MEUI [kWh/(m2 * yr)]	24.7	24	23.6	24.7	23.6	24	24.6	23.5	23.9	24.7
Output: Better than ERS (%)	17810.0%	17340.0%	16990.0%	17810.0%	16990.0%	17340.0%	17770.0%	16950.0%	17270.0%	17810.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5013	5013	5013	5013	5013	5013	4974	4974	4974	4998
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 701.32	$ 701.32	$ 701.32	$ 704.68
Annual savings in carbon tax for electricity [$/year]	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.49	$ 2.49	$ 2.49	$ 2.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 703.81	$ 703.81	$ 703.81	$ 707.17
Annual savings in GHG from electricity savings [kg CO2e/year]	55.1	55.1	55.1	55.1	55.1	55.1	54.7	54.7	54.7	55
Annual savings in natural gas [m3/year]	155.45	156.72	157.54	155.45	157.54	156.72	155.46	157.55	156.73	155.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.23	$ 1,452.03	$ 1,459.59	$ 1,440.23	$ 1,459.59	$ 1,452.03	$ 1,440.29	$ 1,459.66	$ 1,452.07	$ 1,440.26
Annual savings in carbon tax for natural gas [$/year]	$ 359.47	$ 362.42	$ 364.31	$ 359.47	$ 364.31	$ 362.42	$ 359.49	$ 364.32	$ 362.43	$ 359.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.7	$ 1,814.45	$ 1,823.9	$ 1,799.7	$ 1,823.9	$ 1,814.45	$ 1,799.78	$ 1,823.98	$ 1,814.49	$ 1,799.74
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.3	8053.8	8095.7	7988.3	8095.7	8053.8	7988.7	8096.1	8054	7988.5
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 37,005.56	$ 36,889.	$ 37,441.55	$ 37,821.55	$ 37,705.71	$ 38,334.88
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	10.47	10.47	10.47	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35	USi1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 6,113.76	$ 6,113.76	$ 6,113.76	$ 6,113.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 9,549.5	$ 9,549.5	$ 9,549.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 850.	$ 550.	$.	$ 850.	$ 550.	$.

LARGE 25SAR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,215.91	$ 59,515.91	$ 59,584.56	$ 60,134.56	$ 60,434.56	$ 60,415.81
ICC with multiplier (Van=1.0,this Cz =1)	$ 57,387.91	$ 57,937.91	$ 58,237.91	$ 58,665.91	$ 59,215.91	$ 59,515.91	$ 59,584.56	$ 60,134.56	$ 60,434.56	$ 60,415.81
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 36,889.	$ 37,005.56	$ 37,441.55	$ 37,705.71	$ 37,821.55	$ 38,334.88
Incremental dollars per GHG saving	$ 7.23	$ 7.24	$ 7.24	$ 7.4	$ 7.4	$ 7.4	$ 7.51	$ 7.52	$ 7.52	$ 7.62
Auxiliary Energy Required Heating [GJ/yr]	54.8	54.8	54.8	54.8	54.8	54.8	54.7	54.7	54.7	54.6
Annual Energy DHW [GJ/yr]	23.7	22.5	21.7	23.7	22.5	21.7	23.7	22.5	21.6	23.7
Annual Energy Space Heating [GJ/yr]	19	19	19	19	19	19	18.9	18.9	18.9	19
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	71.2	70	69.1	71.2	70	69.1	71.1	69.8	69	71.2
Design Heating Load [W]	10224.3	10224.3	10224.3	10224.3	10224.3	10224.3	10190.5	10190.5	10190.5	10146.6
Annual Energy Electricity [kWh/yr]	13189.5	13189.5	13189.5	13189.5	13189.5	13189.5	13150.3	13150.3	13150.3	13174.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,803.	$ 1,797.45	$ 1,797.45	$ 1,797.45	$ 1,800.82
Annual Energy Natural Gas [m3/yr]	637.6	603.4	581.5	637.6	603.4	581.5	637.4	603.3	581.3	637.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.04	$ 260.29	$ 250.84	$ 275.04	$ 260.29	$ 250.84	$ 274.95	$ 260.24	$ 250.75	$ 275.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51796	51797	51798	52084	52085	52086	52228	52229	52230	52354
Upgrade Package List	Pkg4331303054	Pkg4331303054	Pkg4331303054	Pkg4331403054	Pkg4331403054	Pkg4331403054	Pkg4341302054	Pkg4341302054	Pkg4341302054	Pkg4341303053
GHGI [kg/m2]	2.67	2.54	2.46	2.67	2.54	2.46	2.67	2.54	2.46	2.67
% ICC	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7
Output: MEUI [kWh/(m2 * yr)]	24.7	24	23.6	24.7	24	23.6	24.6	23.9	23.5	24.7
Output: Better than ERS (%)	17810.0%	17340.0%	16990.0%	17810.0%	17340.0%	16990.0%	17770.0%	17270.0%	16950.0%	17810.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5013	5013	5013	5013	5013	5013	4974	4974	4974	4998
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 706.85	$ 701.32	$ 701.32	$ 701.32	$ 704.68
Annual savings in carbon tax for electricity [$/year]	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.49	$ 2.49	$ 2.49	$ 2.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 709.35	$ 703.81	$ 703.81	$ 703.81	$ 707.17
Annual savings in GHG from electricity savings [kg CO2e/year]	55.1	55.1	55.1	55.1	55.1	55.1	54.7	54.7	54.7	55
Annual savings in natural gas [m3/year]	155.45	156.72	157.54	155.45	156.72	157.54	155.46	156.73	157.55	155.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,440.23	$ 1,452.03	$ 1,459.59	$ 1,440.23	$ 1,452.03	$ 1,459.59	$ 1,440.29	$ 1,452.07	$ 1,459.66	$ 1,440.26
Annual savings in carbon tax for natural gas [$/year]	$ 359.47	$ 362.42	$ 364.31	$ 359.47	$ 362.42	$ 364.31	$ 359.49	$ 362.43	$ 364.32	$ 359.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,799.7	$ 1,814.45	$ 1,823.9	$ 1,799.7	$ 1,814.45	$ 1,823.9	$ 1,799.78	$ 1,814.49	$ 1,823.98	$ 1,799.74
Annual savings in GHG from natural gas savings [kg CO2e/year]	7988.3	8053.8	8095.7	7988.3	8053.8	8095.7	7988.7	8054	8096.1	7988.5
Net Present Value [$]	$ 35,347.33	$ 35,611.	$ 35,727.56	$ 36,625.33	$ 36,889.	$ 37,005.56	$ 37,441.55	$ 37,705.71	$ 37,821.55	$ 38,334.88
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	10.47	10.47	10.47	14.09
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 6,113.76	$ 6,113.76	$ 6,113.76	$ 6,113.76
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 9,549.5	$ 9,549.5	$ 9,549.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.

LARGE 25SAR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,858.07	$ 19,408.07	$ 19,708.07	$ 19,756.57	$ 19,893.11	$ 20,196.57	$ 20,218.07	$ 20,306.57	$ 20,354.61	$ 20,443.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 20,234.71	$ 20,824.86	$ 21,146.76	$ 21,198.8	$ 21,345.31	$ 21,670.92	$ 21,693.99	$ 21,788.95	$ 21,840.5	$ 21,935.46
Net Present Value [$]	$ 14,400.19	$ 14,664.59	$ 14,780.43	$ 15,131.81	$ 15,068.73	$ 15,075.96	$ 15,412.79	$ 15,396.21	$ 15,350.44	$ 15,333.13
Incremental dollars per GHG saving	$ 2.17	$ 2.21	$ 2.24	$ 2.27	$ 2.29	$ 2.32	$ 2.32	$ 2.32	$ 2.34	$ 2.33
Auxiliary Energy Required Heating [GJ/yr]	109.5	109.5	109.5	107.1	108.7	105.7	106.4	107.1	107.9	108.7
Annual Energy DHW [GJ/yr]	23.7	22.4	21.6	23.7	23.7	23.7	23.7	22.4	23.7	22.4
Annual Energy Space Heating [GJ/yr]	45	45	45	44	44.5	43.3	43.8	44	44.2	44.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.8	1.8	1.8	1.8	1.1	1.1
Total Energy [GJ/yr]	101.3	100	99.2	101.1	100.8	100.4	100.8	99.8	100.5	99.5
Design Heating Load [W]	18412.3	18412.3	18412.3	18024.5	18384.6	17888.9	17879.7	18024.5	18239.8	18384.6
Annual Energy Electricity [kWh/yr]	21571.2	21571.2	21571.2	21506.4	21429.5	21313.4	21435.9	21506.4	21359.3	21429.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,989.01	$ 2,989.01	$ 2,989.01	$ 2,979.84	$ 2,968.96	$ 2,952.53	$ 2,969.86	$ 2,979.84	$ 2,959.03	$ 2,968.96
Annual Energy Natural Gas [m3/yr]	635.3	601.2	579.2	635.3	635.1	635.4	635.4	601.2	635.2	601
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.05	$ 259.34	$ 249.85	$ 274.05	$ 273.96	$ 274.09	$ 274.09	$ 259.34	$ 274.	$ 259.25
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11728	11729	11730	11476	13078	11494	11746	11477	13348	13079
Upgrade Package List	Pkg2121102031	Pkg2121102031	Pkg2121102031	Pkg2121101032	Pkg2131101031	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2131102031	Pkg2131101031
GHGI [kg/m2]	2.84	2.72	2.63	2.84	2.84	2.84	2.84	2.72	2.84	2.71
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	59.5	59.5	59.5	58.2	59.1	57.5	57.8	58.2	58.7	59.1
Output: MEUI [kWh/(m2 * yr)]	40.6	39.9	39.5	40.5	40.3	40.1	40.3	39.8	40.2	39.6
Output: Better than ERS (%)	29570.0%	29060.0%	28750.0%	29490.0%	29370.0%	29220.0%	29370.0%	28980.0%	29260.0%	28870.0%
Output: Better than Envelope (%)	1020.0%	1020.0%	1020.0%	1210.0%	1080.0%	1330.0%	1270.0%	1210.0%	1150.0%	1080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13306	13306	13306	13241	13164	13048	13170	13241	13094	13164
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,876.09	$ 1,876.09	$ 1,876.09	$ 1,866.95	$ 1,856.11	$ 1,839.74	$ 1,857.01	$ 1,866.95	$ 1,846.21	$ 1,856.11
Annual savings in carbon tax for electricity [$/year]	$ 6.65	$ 6.65	$ 6.65	$ 6.62	$ 6.58	$ 6.52	$ 6.59	$ 6.62	$ 6.55	$ 6.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,882.74	$ 1,882.74	$ 1,882.74	$ 1,873.57	$ 1,862.69	$ 1,846.26	$ 1,863.6	$ 1,873.57	$ 1,852.76	$ 1,862.69
Annual savings in GHG from electricity savings [kg CO2e/year]	146.4	146.4	146.4	145.6	144.8	143.5	144.9	145.6	144	144.8
Annual savings in natural gas [m3/year]	172.2	173.47	174.29	172.2	172.21	172.2	172.2	173.47	172.2	173.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,595.43	$ 1,607.2	$ 1,614.79	$ 1,595.43	$ 1,595.5	$ 1,595.39	$ 1,595.39	$ 1,607.2	$ 1,595.46	$ 1,607.27
Annual savings in carbon tax for natural gas [$/year]	$ 398.21	$ 401.15	$ 403.05	$ 398.21	$ 398.23	$ 398.2	$ 398.2	$ 401.15	$ 398.22	$ 401.17
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,993.64	$ 2,008.35	$ 2,017.84	$ 1,993.64	$ 1,993.73	$ 1,993.6	$ 1,993.6	$ 2,008.35	$ 1,993.68	$ 2,008.44
Annual savings in GHG from natural gas savings [kg CO2e/year]	8849.1	8914.4	8956.6	8849.1	8849.5	8849	8849	8914.4	8849.3	8914.8
Net Present Value [$]	$ 14,400.19	$ 14,664.59	$ 14,780.43	$ 15,131.81	$ 15,068.73	$ 15,075.96	$ 15,412.79	$ 15,396.21	$ 15,350.44	$ 15,333.13
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	HRV sre 75	HRV sre 60	HRV sre 60	NA	NA
Ventilation System Code	NA	NA	NA	HRV sre 60	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$ 550.	$.	$ 550.

LARGE 25SAR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 18,858.07	$ 19,408.07	$ 19,708.07	$ 20,796.57	$ 20,818.07	$ 19,756.57	$ 19,893.11	$ 21,346.57	$ 21,368.07	$ 21,258.07
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 20,234.71	$ 20,824.86	$ 21,146.76	$ 22,314.72	$ 22,337.79	$ 21,198.8	$ 21,345.31	$ 22,904.87	$ 22,927.94	$ 22,809.91
Net Present Value [$]	$ 14,400.19	$ 14,664.59	$ 14,780.43	$ 14,082.98	$ 14,286.51	$ 15,131.81	$ 15,068.73	$ 14,391.31	$ 14,594.67	$ 14,357.33
Incremental dollars per GHG saving	$ 2.17	$ 2.21	$ 2.24	$ 2.25	$ 2.26	$ 2.27	$ 2.29	$ 2.3	$ 2.3	$ 2.3
Auxiliary Energy Required Heating [GJ/yr]	109.5	109.5	109.5	108.4	109	107.1	108.7	108.4	109.1	107.7
Annual Energy DHW [GJ/yr]	23.7	22.4	21.6	13.5	13.5	23.7	23.7	12.4	12.4	13.5
Annual Energy Space Heating [GJ/yr]	45	45	45	44.3	44.6	44	44.5	44.3	44.6	44.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.8	1.8	1.8	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	101.3	100	99.2	91.2	91.4	101.1	100.8	90.1	90.4	90.9
Design Heating Load [W]	18412.3	18412.3	18412.3	17696.8	17687.6	18024.5	18384.6	17696.8	17687.6	17552
Annual Energy Electricity [kWh/yr]	21571.2	21571.2	21571.2	21583.9	21654.6	21506.4	21429.5	21585	21655.7	21511.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,989.01	$ 2,989.01	$ 2,989.01	$ 2,990.81	$ 3,000.81	$ 2,979.84	$ 2,968.96	$ 2,990.96	$ 3,000.97	$ 2,980.52
Annual Energy Natural Gas [m3/yr]	635.3	601.2	579.2	362.1	362.1	635.3	635.1	332.9	332.9	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.05	$ 259.34	$ 249.85	$ 156.2	$ 156.2	$ 274.05	$ 273.96	$ 143.6	$ 143.6	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11728	11729	11730	11497	11749	11476	13078	11498	11750	11767
Upgrade Package List	Pkg2121102031	Pkg2121102031	Pkg2121102031	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2131101031	Pkg2121101033	Pkg2121102032	Pkg2121102033
GHGI [kg/m2]	2.84	2.72	2.63	1.82	1.82	2.84	2.84	1.71	1.71	1.82
% ICC	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	59.5	59.5	59.5	58.9	59.3	58.2	59.1	58.9	59.3	58.5
Output: MEUI [kWh/(m2 * yr)]	40.6	39.9	39.5	35.1	35.2	40.5	40.3	34.5	34.6	34.9
Output: Better than ERS (%)	29570.0%	29060.0%	28750.0%	25620.0%	25700.0%	29490.0%	29370.0%	25200.0%	25310.0%	25510.0%
Output: Better than Envelope (%)	1020.0%	1020.0%	1020.0%	1110.0%	1060.0%	1210.0%	1080.0%	1110.0%	1050.0%	1160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13306	13306	13306	13318	13389	13241	13164	13319	13390	13246
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,876.09	$ 1,876.09	$ 1,876.09	$ 1,877.88	$ 1,887.85	$ 1,866.95	$ 1,856.11	$ 1,878.04	$ 1,888.	$ 1,867.63
Annual savings in carbon tax for electricity [$/year]	$ 6.65	$ 6.65	$ 6.65	$ 6.66	$ 6.69	$ 6.62	$ 6.58	$ 6.66	$ 6.7	$ 6.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,882.74	$ 1,882.74	$ 1,882.74	$ 1,884.54	$ 1,894.54	$ 1,873.57	$ 1,862.69	$ 1,884.7	$ 1,894.7	$ 1,874.25
Annual savings in GHG from electricity savings [kg CO2e/year]	146.4	146.4	146.4	146.5	147.3	145.6	144.8	146.5	147.3	145.7
Annual savings in natural gas [m3/year]	172.2	173.47	174.29	182.38	182.38	172.2	172.21	183.47	183.47	182.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,595.43	$ 1,607.2	$ 1,614.79	$ 1,689.74	$ 1,689.74	$ 1,595.43	$ 1,595.5	$ 1,699.82	$ 1,699.82	$ 1,689.74
Annual savings in carbon tax for natural gas [$/year]	$ 398.21	$ 401.15	$ 403.05	$ 421.75	$ 421.75	$ 398.21	$ 398.23	$ 424.27	$ 424.27	$ 421.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,993.64	$ 2,008.35	$ 2,017.84	$ 2,111.49	$ 2,111.49	$ 1,993.64	$ 1,993.73	$ 2,124.09	$ 2,124.09	$ 2,111.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	8849.1	8914.4	8956.6	9372.2	9372.2	8849.1	8849.5	9428.1	9428.1	9372.2
Net Present Value [$]	$ 14,400.19	$ 14,664.59	$ 14,780.43	$ 14,082.98	$ 14,286.51	$ 15,131.81	$ 15,068.73	$ 14,391.31	$ 14,594.67	$ 14,357.33
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$.	$.	$ 550.	$ 550.	$.

LARGE 25SAR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,966.55	$ 22,055.05	$ 22,355.05	$ 22,076.55	$ 22,516.55	$ 22,376.55	$ 22,816.55	$ 23,001.59	$ 23,023.09	$ 23,111.59
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 23,570.11	$ 23,665.07	$ 23,986.97	$ 23,688.14	$ 24,160.26	$ 24,010.04	$ 24,482.16	$ 24,680.71	$ 24,703.78	$ 24,798.74
Net Present Value [$]	$ 3,583.86	$ 3,615.61	$ 3,760.74	$ 3,793.16	$ 3,891.88	$ 3,938.35	$ 4,037.07	$ 4,420.38	$ 4,597.02	$ 4,628.77
Incremental dollars per GHG saving	$ 5.32	$ 5.33	$ 5.35	$ 5.37	$ 5.38	$ 5.4	$ 5.41	$ 5.52	$ 5.57	$ 5.57
Auxiliary Energy Required Heating [GJ/yr]	98.1	98.9	98.9	99.5	98.1	99.5	98.1	97.3	97.9	98.7
Annual Energy DHW [GJ/yr]	13.5	12.4	11.7	12.4	12.4	11.7	11.7	13.5	13.5	12.4
Annual Energy Space Heating [GJ/yr]	103.9	104.7	104.7	105.4	103.9	105.4	103.9	103.1	103.7	104.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	144.8	144.5	143.9	145.2	143.7	144.5	143.1	144	144.6	144.4
Design Heating Load [W]	16247.1	16391.9	16391.9	16382.7	16247.1	16382.7	16247.1	16219.4	16210.2	16355
Annual Energy Electricity [kWh/yr]	8135	8139	8139.1	8142.4	8135.1	8142.4	8135.1	8130.8	8134.1	8138.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,087.79	$ 1,088.35	$ 1,088.37	$ 1,088.83	$ 1,087.8	$ 1,088.83	$ 1,087.8	$ 1,087.19	$ 1,087.66	$ 1,088.23
Annual Energy Natural Gas [m3/yr]	3102.5	3094.5	3076	3112.1	3073.6	3093.6	3055.1	3080.1	3097.6	3089.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,338.31	$ 1,334.86	$ 1,326.88	$ 1,342.45	$ 1,325.84	$ 1,334.47	$ 1,317.86	$ 1,328.65	$ 1,336.2	$ 1,332.75
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	18130	17861	17862	18113	18131	18114	18132	20992	21244	20975
Upgrade Package List	Pkg2221102033	Pkg2221101033	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2221102032	Pkg2221102033	Pkg2231101033	Pkg2231102032	Pkg2231101032
GHGI [kg/m2]	11.8	11.77	11.7	11.84	11.69	11.77	11.62	11.72	11.78	11.75
% ICC	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53.3	53.7	53.7	54.1	53.3	54.1	53.3	52.9	53.2	53.6
Output: MEUI [kWh/(m2 * yr)]	64.8	64.6	64.3	65	64.2	64.6	63.8	64.3	64.7	64.5
Output: Better than ERS (%)	46560.0%	46450.0%	46210.0%	46720.0%	46130.0%	46450.0%	45900.0%	46250.0%	46480.0%	46410.0%
Output: Better than Envelope (%)	1950.0%	1890.0%	1890.0%	1840.0%	1950.0%	1840.0%	1950.0%	2020.0%	1970.0%	1900.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	131	127	126	123	130	123	130	135	132	128
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 18.41	$ 17.85	$ 17.84	$ 17.37	$ 18.4	$ 17.37	$ 18.4	$ 19.01	$ 18.54	$ 17.98
Annual savings in carbon tax for electricity [$/year]	$ .07	$ .06	$ .06	$ .06	$ .07	$ .06	$ .07	$ .07	$ .07	$ .06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 18.48	$ 17.91	$ 17.9	$ 17.43	$ 18.47	$ 17.43	$ 18.47	$ 19.07	$ 18.61	$ 18.04
Annual savings in GHG from electricity savings [kg CO2e/year]	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.4
Annual savings in natural gas [m3/year]	80.27	80.57	81.26	79.92	81.35	80.61	82.04	81.11	80.46	80.75
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 743.74	$ 746.5	$ 752.89	$ 740.43	$ 753.72	$ 746.81	$ 760.1	$ 751.47	$ 745.43	$ 748.19
Annual savings in carbon tax for natural gas [$/year]	$ 185.63	$ 186.32	$ 187.92	$ 184.81	$ 188.12	$ 186.4	$ 189.72	$ 187.56	$ 186.06	$ 186.75
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 929.38	$ 932.83	$ 940.81	$ 925.24	$ 941.84	$ 933.22	$ 949.82	$ 939.04	$ 931.49	$ 934.94
Annual savings in GHG from natural gas savings [kg CO2e/year]	4125.2	4140.5	4175.9	4106.8	4180.5	4142.3	4216	4168.1	4134.6	4149.9
Net Present Value [$]	$ 3,583.86	$ 3,615.61	$ 3,760.74	$ 3,793.16	$ 3,891.88	$ 3,938.35	$ 4,037.07	$ 4,420.38	$ 4,597.02	$ 4,628.77
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	8.77	10.47	10.47	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.

LARGE 25SAR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,615.05	$ 24,055.05	$ 24,076.55	$ 24,165.05	$ 24,465.05	$ 24,516.55	$ 24,605.05	$ 24,626.55	$ 24,905.05	$ 24,926.55
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,338.95	$ 25,811.07	$ 25,834.14	$ 25,929.1	$ 26,251.	$ 26,306.26	$ 26,401.22	$ 26,424.29	$ 26,723.12	$ 26,746.19
Net Present Value [$]	$ 15,974.04	$ 16,053.62	$ 16,254.78	$ 16,238.2	$ 16,354.03	$ 16,334.17	$ 16,317.78	$ 16,518.21	$ 16,433.61	$ 16,634.04
Incremental dollars per GHG saving	$ 2.71	$ 2.76	$ 2.76	$ 2.75	$ 2.77	$ 2.81	$ 2.8	$ 2.8	$ 2.82	$ 2.83
Auxiliary Energy Required Heating [GJ/yr]	97.2	95.8	96.5	97.2	97.2	95.1	95.8	96.5	95.8	96.5
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.4	21.6	23.7	22.4	22.4	21.6	21.6
Annual Energy Space Heating [GJ/yr]	39.9	39.4	39.7	39.9	39.9	39.2	39.4	39.7	39.4	39.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	96.9	96.4	96.6	95.6	94.8	96.1	95.1	95.3	94.3	94.5
Design Heating Load [W]	16776.2	16640.7	16631.4	16776.2	16776.2	16495.9	16640.7	16631.4	16640.7	16631.4
Annual Energy Electricity [kWh/yr]	20334.4	20194.4	20263.9	20334.4	20334.4	20123.8	20194.4	20263.9	20194.4	20263.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,814.	$ 2,794.19	$ 2,804.03	$ 2,814.	$ 2,814.	$ 2,784.2	$ 2,794.19	$ 2,804.03	$ 2,794.19	$ 2,804.03
Annual Energy Natural Gas [m3/yr]	635.4	635.4	635.5	601.3	579.3	635.5	601.3	601.3	579.3	579.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.09	$ 274.09	$ 274.13	$ 259.38	$ 249.89	$ 274.13	$ 259.38	$ 259.38	$ 249.89	$ 249.89
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17848	17866	18118	17849	17850	18136	17867	18119	17868	18120
Upgrade Package List	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101032	Pkg2221102033	Pkg2221101033	Pkg2221102032	Pkg2221101033	Pkg2221102032
GHGI [kg/m2]	2.82	2.82	2.82	2.69	2.61	2.81	2.69	2.69	2.61	2.61
% ICC	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	52.8	52.1	52.4	52.8	52.8	51.7	52.1	52.4	52.1	52.4
Output: MEUI [kWh/(m2 * yr)]	38.2	37.9	38	37.5	37	37.8	37.2	37.3	36.8	36.9
Output: Better than ERS (%)	27850.0%	27660.0%	27730.0%	27340.0%	27030.0%	27540.0%	27150.0%	27230.0%	26840.0%	26910.0%
Output: Better than Envelope (%)	2030.0%	2140.0%	2080.0%	2030.0%	2030.0%	2200.0%	2140.0%	2080.0%	2140.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12069	11929	11998	12069	12069	11858	11929	11998	11929	11998
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,701.7	$ 1,681.96	$ 1,691.76	$ 1,701.7	$ 1,701.7	$ 1,672.01	$ 1,681.96	$ 1,691.76	$ 1,681.96	$ 1,691.76
Annual savings in carbon tax for electricity [$/year]	$ 6.03	$ 5.96	$ 6.	$ 6.03	$ 6.03	$ 5.93	$ 5.96	$ 6.	$ 5.96	$ 6.
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,707.74	$ 1,687.93	$ 1,697.76	$ 1,707.74	$ 1,707.74	$ 1,677.94	$ 1,687.93	$ 1,697.76	$ 1,687.93	$ 1,697.76
Annual savings in GHG from electricity savings [kg CO2e/year]	132.8	131.2	132	132.8	132.8	130.4	131.2	132	131.2	132
Annual savings in natural gas [m3/year]	172.2	172.2	172.19	173.47	174.29	172.19	173.47	173.47	174.29	174.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,595.39	$ 1,595.39	$ 1,595.36	$ 1,607.17	$ 1,614.76	$ 1,595.36	$ 1,607.17	$ 1,607.17	$ 1,614.76	$ 1,614.76
Annual savings in carbon tax for natural gas [$/year]	$ 398.2	$ 398.2	$ 398.19	$ 401.14	$ 403.04	$ 398.19	$ 401.14	$ 401.14	$ 403.04	$ 403.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,993.6	$ 1,993.6	$ 1,993.55	$ 2,008.31	$ 2,017.8	$ 1,993.55	$ 2,008.31	$ 2,008.31	$ 2,017.8	$ 2,017.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	8849	8849	8848.8	8914.2	8956.4	8848.8	8914.2	8914.2	8956.4	8956.4
Net Present Value [$]	$ 15,974.04	$ 16,053.62	$ 16,254.78	$ 16,238.2	$ 16,354.03	$ 16,334.17	$ 16,317.78	$ 16,518.21	$ 16,433.61	$ 16,634.04
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$ 550.	$ 850.	$ 850.

LARGE 25SAR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,615.05	$ 24,165.05	$ 24,055.05	$ 24,076.55	$ 24,465.05	$ 24,605.05	$ 24,626.55	$ 24,516.55	$ 24,905.05	$ 24,926.55
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,338.95	$ 25,929.1	$ 25,811.07	$ 25,834.14	$ 26,251.	$ 26,401.22	$ 26,424.29	$ 26,306.26	$ 26,723.12	$ 26,746.19
Net Present Value [$]	$ 15,974.04	$ 16,238.2	$ 16,053.62	$ 16,254.78	$ 16,354.03	$ 16,317.78	$ 16,518.21	$ 16,334.17	$ 16,433.61	$ 16,634.04
Incremental dollars per GHG saving	$ 2.71	$ 2.75	$ 2.76	$ 2.76	$ 2.77	$ 2.8	$ 2.8	$ 2.81	$ 2.82	$ 2.83
Auxiliary Energy Required Heating [GJ/yr]	97.2	97.2	95.8	96.5	97.2	95.8	96.5	95.1	95.8	96.5
Annual Energy DHW [GJ/yr]	23.7	22.4	23.7	23.7	21.6	22.4	22.4	23.7	21.6	21.6
Annual Energy Space Heating [GJ/yr]	39.9	39.9	39.4	39.7	39.9	39.4	39.7	39.2	39.4	39.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	96.9	95.6	96.4	96.6	94.8	95.1	95.3	96.1	94.3	94.5
Design Heating Load [W]	16776.2	16776.2	16640.7	16631.4	16776.2	16640.7	16631.4	16495.9	16640.7	16631.4
Annual Energy Electricity [kWh/yr]	20334.4	20334.4	20194.4	20263.9	20334.4	20194.4	20263.9	20123.8	20194.4	20263.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,814.	$ 2,814.	$ 2,794.19	$ 2,804.03	$ 2,814.	$ 2,794.19	$ 2,804.03	$ 2,784.2	$ 2,794.19	$ 2,804.03
Annual Energy Natural Gas [m3/yr]	635.4	601.3	635.4	635.5	579.3	601.3	601.3	635.5	579.3	579.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.09	$ 259.38	$ 274.09	$ 274.13	$ 249.89	$ 259.38	$ 259.38	$ 274.13	$ 249.89	$ 249.89
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17848	17849	17866	18118	17850	17867	18119	18136	17868	18120
Upgrade Package List	Pkg2221101032	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221102033	Pkg2221101033	Pkg2221102032
GHGI [kg/m2]	2.82	2.69	2.82	2.82	2.61	2.69	2.69	2.81	2.61	2.61
% ICC	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	52.8	52.8	52.1	52.4	52.8	52.1	52.4	51.7	52.1	52.4
Output: MEUI [kWh/(m2 * yr)]	38.2	37.5	37.9	38	37	37.2	37.3	37.8	36.8	36.9
Output: Better than ERS (%)	27850.0%	27340.0%	27660.0%	27730.0%	27030.0%	27150.0%	27230.0%	27540.0%	26840.0%	26910.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2140.0%	2080.0%	2030.0%	2140.0%	2080.0%	2200.0%	2140.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12069	12069	11929	11998	12069	11929	11998	11858	11929	11998
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,701.7	$ 1,701.7	$ 1,681.96	$ 1,691.76	$ 1,701.7	$ 1,681.96	$ 1,691.76	$ 1,672.01	$ 1,681.96	$ 1,691.76
Annual savings in carbon tax for electricity [$/year]	$ 6.03	$ 6.03	$ 5.96	$ 6.	$ 6.03	$ 5.96	$ 6.	$ 5.93	$ 5.96	$ 6.
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,707.74	$ 1,707.74	$ 1,687.93	$ 1,697.76	$ 1,707.74	$ 1,687.93	$ 1,697.76	$ 1,677.94	$ 1,687.93	$ 1,697.76
Annual savings in GHG from electricity savings [kg CO2e/year]	132.8	132.8	131.2	132	132.8	131.2	132	130.4	131.2	132
Annual savings in natural gas [m3/year]	172.2	173.47	172.2	172.19	174.29	173.47	173.47	172.19	174.29	174.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,595.39	$ 1,607.17	$ 1,595.39	$ 1,595.36	$ 1,614.76	$ 1,607.17	$ 1,607.17	$ 1,595.36	$ 1,614.76	$ 1,614.76
Annual savings in carbon tax for natural gas [$/year]	$ 398.2	$ 401.14	$ 398.2	$ 398.19	$ 403.04	$ 401.14	$ 401.14	$ 398.19	$ 403.04	$ 403.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,993.6	$ 2,008.31	$ 1,993.6	$ 1,993.55	$ 2,017.8	$ 2,008.31	$ 2,008.31	$ 1,993.55	$ 2,017.8	$ 2,017.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	8849	8914.2	8849	8848.8	8956.4	8914.2	8914.2	8848.8	8956.4	8956.4
Net Present Value [$]	$ 15,974.04	$ 16,238.2	$ 16,053.62	$ 16,254.78	$ 16,354.03	$ 16,317.78	$ 16,518.21	$ 16,334.17	$ 16,433.61	$ 16,634.04
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$ 550.	$ 550.	$.	$ 850.	$ 850.

LARGE 25SAR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,615.05	$ 26,151.59	$ 24,055.05	$ 24,165.05	$ 24,076.55	$ 26,613.09	$ 24,605.05	$ 26,701.59	$ 24,516.55	$ 24,465.05
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,338.95	$ 28,060.66	$ 25,811.07	$ 25,929.1	$ 25,834.14	$ 28,555.85	$ 26,401.22	$ 28,650.81	$ 26,306.26	$ 26,251.
Net Present Value [$]	$ 15,974.04	$ 16,019.46	$ 16,053.62	$ 16,238.2	$ 16,254.78	$ 16,292.71	$ 16,317.78	$ 16,327.61	$ 16,334.17	$ 16,354.03
Incremental dollars per GHG saving	$ 2.71	$ 2.83	$ 2.76	$ 2.75	$ 2.76	$ 2.88	$ 2.8	$ 2.87	$ 2.81	$ 2.77
Auxiliary Energy Required Heating [GJ/yr]	97.2	97	95.8	97.2	96.5	96.2	95.8	97	95.1	97.2
Annual Energy DHW [GJ/yr]	23.7	13.5	23.7	22.4	23.7	13.5	22.4	12.4	23.7	21.6
Annual Energy Space Heating [GJ/yr]	39.9	39.6	39.4	39.9	39.7	39.4	39.4	39.6	39.2	39.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	96.9	86.4	96.4	95.6	96.6	86.1	95.1	85.3	96.1	94.8
Design Heating Load [W]	16776.2	16276	16640.7	16776.2	16631.4	16131.3	16640.7	16276	16495.9	16776.2
Annual Energy Electricity [kWh/yr]	20334.4	20256	20194.4	20334.4	20263.9	20182.9	20194.4	20257.1	20123.8	20334.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,814.	$ 2,802.91	$ 2,794.19	$ 2,814.	$ 2,804.03	$ 2,792.57	$ 2,794.19	$ 2,803.06	$ 2,784.2	$ 2,814.
Annual Energy Natural Gas [m3/yr]	635.4	362.1	635.4	601.3	635.5	362.1	601.3	332.9	635.5	579.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.09	$ 156.2	$ 274.09	$ 259.38	$ 274.13	$ 156.2	$ 259.38	$ 143.6	$ 274.13	$ 249.89
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17848	21001	17866	17849	18118	21271	17867	21002	18136	17850
Upgrade Package List	Pkg2221101032	Pkg2231101033	Pkg2221101033	Pkg2221101032	Pkg2221102032	Pkg2231102033	Pkg2231101033	Pkg2231101033	Pkg2221102033	Pkg2221101032
GHGI [kg/m2]	2.82	1.79	2.82	2.69	2.82	1.79	2.69	1.68	2.81	2.61
% ICC	2.1%	2.3%	2.1%	2.1%	2.1%	2.4%	2.2%	2.4%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	52.8	52.7	52.1	52.8	52.4	52.3	52.1	52.7	51.7	52.8
Output: MEUI [kWh/(m2 * yr)]	38.2	32.5	37.9	37.5	38	32.3	37.2	31.9	37.8	37
Output: Better than ERS (%)	27850.0%	23750.0%	27660.0%	27340.0%	27730.0%	23630.0%	27150.0%	23320.0%	27540.0%	27030.0%
Output: Better than Envelope (%)	2030.0%	2040.0%	2140.0%	2030.0%	2080.0%	2110.0%	2140.0%	2040.0%	2200.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12069	11990	11929	12069	11998	11917	11929	11992	11858	12069
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,701.7	$ 1,690.65	$ 1,681.96	$ 1,701.7	$ 1,691.76	$ 1,680.34	$ 1,681.96	$ 1,690.8	$ 1,672.01	$ 1,701.7
Annual savings in carbon tax for electricity [$/year]	$ 6.03	$ 6.	$ 5.96	$ 6.03	$ 6.	$ 5.96	$ 5.96	$ 6.	$ 5.93	$ 6.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,707.74	$ 1,696.64	$ 1,687.93	$ 1,707.74	$ 1,697.76	$ 1,686.3	$ 1,687.93	$ 1,696.8	$ 1,677.94	$ 1,707.74
Annual savings in GHG from electricity savings [kg CO2e/year]	132.8	131.9	131.2	132.8	132	131.1	131.2	131.9	130.4	132.8
Annual savings in natural gas [m3/year]	172.2	182.38	172.2	173.47	172.19	182.38	173.47	183.47	172.19	174.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,595.39	$ 1,689.74	$ 1,595.39	$ 1,607.17	$ 1,595.36	$ 1,689.74	$ 1,607.17	$ 1,699.82	$ 1,595.36	$ 1,614.76
Annual savings in carbon tax for natural gas [$/year]	$ 398.2	$ 421.75	$ 398.2	$ 401.14	$ 398.19	$ 421.75	$ 401.14	$ 424.27	$ 398.19	$ 403.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,993.6	$ 2,111.49	$ 1,993.6	$ 2,008.31	$ 1,993.55	$ 2,111.49	$ 2,008.31	$ 2,124.09	$ 1,993.55	$ 2,017.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	8849	9372.2	8849	8914.2	8848.8	9372.2	8914.2	9428.1	8848.8	8956.4
Net Present Value [$]	$ 15,974.04	$ 16,019.46	$ 16,053.62	$ 16,238.2	$ 16,254.78	$ 16,292.71	$ 16,317.78	$ 16,327.61	$ 16,334.17	$ 16,354.03
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 550.	$.	$ 850.

LARGE 25SAR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,156.28	$ 22,256.73	$ 22,706.28	$ 22,718.22	$ 22,806.73	$ 22,856.73	$ 23,006.28	$ 23,106.73	$ 23,268.22	$ 23,318.22
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 24,947.97	$ 25,061.08	$ 25,567.27	$ 25,580.72	$ 25,680.38	$ 25,736.68	$ 25,905.07	$ 26,018.18	$ 26,200.02	$ 26,256.32
Net Present Value [$]	$ 12,392.43	$ 10,597.83	$ 12,624.8	$ 10,826.21	$ 10,830.45	$ 9,402.12	$ 12,718.8	$ 10,924.44	$ 11,058.59	$ 9,631.91
Incremental dollars per GHG saving	$ 1.98	$ 1.99	$ 2.02	$ 2.03	$ 2.02	$ 1.95	$ 2.03	$ 2.04	$ 2.06	$ 1.99
Auxiliary Energy Required Heating [GJ/yr]	143	138.3	143	137.4	138.3	141	143	138.3	137.4	140
Annual Energy DHW [GJ/yr]	24.7	24.7	23.3	24.7	23.3	14.3	22.4	22.4	23.3	14.3
Annual Energy Space Heating [GJ/yr]	55.4	53.5	55.4	53.2	53.5	54.3	55.4	53.5	53.2	54
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.1	1.8	1.1	1.8	1.1	1.8	1.1	1.1	1.1
Total Energy [GJ/yr]	111.2	108.6	109.8	108.3	107.2	98.9	108.9	106.3	106.9	98.6
Design Heating Load [W]	22885.9	22523.1	22885.9	22335.3	22523.1	22233.9	22885.9	22523.1	22335.3	22046.1
Annual Energy Electricity [kWh/yr]	24043.7	23307.3	24043.7	23216.4	23307.3	23521.8	24043.7	23307.3	23216.4	23431.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,338.87	$ 3,234.67	$ 3,338.87	$ 3,221.81	$ 3,234.67	$ 3,265.02	$ 3,338.87	$ 3,234.67	$ 3,221.81	$ 3,252.28
Annual Energy Natural Gas [m3/yr]	662.9	663	625	663.1	625.1	382.7	600.4	600.5	625.2	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 285.95	$ 286.	$ 269.6	$ 286.04	$ 269.65	$ 165.08	$ 258.99	$ 259.03	$ 269.69	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13384	17830	13385	18100	17831	17833	13386	17832	18101	18103
Upgrade Package List	Pkg2131102033	Pkg2221101031	Pkg2131102033	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2131102033	Pkg2221101031	Pkg2221102031	Pkg2221102031
GHGI [kg/m2]	3	2.99	2.86	2.98	2.84	1.94	2.77	2.75	2.84	1.94
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.7	75.2	77.2	74.7	75.2	76.7	77.7	75.2	74.7	76.1
Output: MEUI [kWh/(m2 * yr)]	46.2	44.8	45.4	44.6	44	39.5	44.9	43.5	43.8	39.3
Output: Better than ERS (%)	33440.0%	32420.0%	32890.0%	32300.0%	31870.0%	28630.0%	32540.0%	31520.0%	31760.0%	28520.0%
Output: Better than Envelope (%)	1040.0%	1330.0%	1040.0%	1390.0%	1330.0%	1170.0%	1040.0%	1330.0%	1390.0%	1230.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15516	14780	15516	14689	14780	14994	15516	14780	14689	14904
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,187.74	$ 2,083.91	$ 2,187.74	$ 2,071.09	$ 2,083.91	$ 2,114.15	$ 2,187.74	$ 2,083.91	$ 2,071.09	$ 2,101.46
Annual savings in carbon tax for electricity [$/year]	$ 7.76	$ 7.39	$ 7.76	$ 7.34	$ 7.39	$ 7.5	$ 7.76	$ 7.39	$ 7.34	$ 7.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,195.5	$ 2,091.3	$ 2,195.5	$ 2,078.44	$ 2,091.3	$ 2,121.65	$ 2,195.5	$ 2,091.3	$ 2,078.44	$ 2,108.92
Annual savings in GHG from electricity savings [kg CO2e/year]	170.7	162.6	170.7	161.6	162.6	164.9	170.7	162.6	161.6	163.9
Annual savings in natural gas [m3/year]	221.11	221.11	222.53	221.11	222.52	231.55	223.44	223.44	222.52	231.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,048.61	$ 2,048.58	$ 2,061.7	$ 2,048.54	$ 2,061.66	$ 2,145.34	$ 2,070.19	$ 2,070.15	$ 2,061.63	$ 2,145.34
Annual savings in carbon tax for natural gas [$/year]	$ 511.32	$ 511.32	$ 514.59	$ 511.31	$ 514.58	$ 535.47	$ 516.71	$ 516.7	$ 514.57	$ 535.47
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,559.94	$ 2,559.89	$ 2,576.29	$ 2,559.85	$ 2,576.24	$ 2,680.8	$ 2,586.9	$ 2,586.85	$ 2,576.2	$ 2,680.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	11362.8	11362.6	11435.3	11362.4	11435.1	11899.3	11482.4	11482.2	11434.9	11899.3
Net Present Value [$]	$ 12,392.43	$ 10,597.83	$ 12,624.8	$ 10,826.21	$ 10,830.45	$ 9,402.12	$ 12,718.8	$ 10,924.44	$ 11,058.59	$ 9,631.91
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	8.77	10.47	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	5.28	3.87	5.28	5.28	5.28	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	NA	HRV sre 75	NA	NA	NA	HRV sre 75	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$.	$ 1,800.	$.	$.	$.	$ 1,800.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$ 850.	$ 550.	$.

LARGE 25SAR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,856.73	$ 22,156.28	$ 23,406.73	$ 23,318.22	$ 22,256.73	$ 23,706.73	$ 24,990.73	$ 22,706.28	$ 23,868.22	$ 22,806.73
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,736.68	$ 24,947.97	$ 26,355.98	$ 26,256.32	$ 25,061.08	$ 26,693.78	$ 28,139.56	$ 25,567.27	$ 26,875.62	$ 25,680.38
Net Present Value [$]	$ 9,402.12	$ 12,392.43	$ 9,685.04	$ 9,631.91	$ 10,597.83	$ 9,811.13	$ 14,935.17	$ 12,624.8	$ 9,914.46	$ 10,830.45
Incremental dollars per GHG saving	$ 1.95	$ 1.98	$ 1.98	$ 1.99	$ 1.99	$ 2.	$ 2.01	$ 2.02	$ 2.02	$ 2.02
Auxiliary Energy Required Heating [GJ/yr]	141	143	141	140	138.3	141	142	143	140.1	138.3
Annual Energy DHW [GJ/yr]	14.3	24.7	13	14.3	24.7	12.3	8.2	23.3	13	23.3
Annual Energy Space Heating [GJ/yr]	54.3	55.4	54.3	54	53.5	54.3	54.7	55.4	54	53.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.1	1.1	1.1	1.1	1.8	1.8	1.1	1.1
Total Energy [GJ/yr]	98.9	111.2	97.7	98.6	108.6	97	93.9	109.8	97.4	107.2
Design Heating Load [W]	22233.9	22885.9	22233.9	22046.1	22523.1	22233.9	21832.2	22885.9	22046.1	22523.1
Annual Energy Electricity [kWh/yr]	23521.8	24043.7	23523.1	23431.8	23307.3	23523.9	26087.2	24043.7	23433	23307.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,265.02	$ 3,338.87	$ 3,265.2	$ 3,252.28	$ 3,234.67	$ 3,265.32	$ 3,628.02	$ 3,338.87	$ 3,252.45	$ 3,234.67
Annual Energy Natural Gas [m3/yr]	382.7	662.9	350.4	382.7	663	329.4	0	625	350.4	625.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 285.95	$ 151.15	$ 165.08	$ 286.	$ 142.09	$.	$ 269.6	$ 151.15	$ 269.65
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	13384	17834	18103	17830	17835	17854	13385	18104	17831
Upgrade Package List	Pkg2221101031	Pkg2131102033	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221101032	Pkg2131102033	Pkg2221102031	Pkg2221101031
GHGI [kg/m2]	1.94	3	1.82	1.74	2.99	1.74	0.56	2.86	1.82	2.84
% ICC	2.0%	2.0%	2.1%	2.1%	2.0%	2.1%	2.2%	2.0%	2.1%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	76.7	77.7	76.7	76.1	75.2	76.7	77.2	77.7	76.1	75.2
Output: MEUI [kWh/(m2 * yr)]	39.5	46.2	38.9	39.3	44.8	38.4	36.8	45.4	38.7	44
Output: Better than ERS (%)	28630.0%	33440.0%	28160.0%	28520.0%	32420.0%	27890.0%	26680.0%	32890.0%	28050.0%	31870.0%
Output: Better than Envelope (%)	1170.0%	1040.0%	1170.0%	1230.0%	1330.0%	1170.0%	1100.0%	1040.0%	1220.0%	1330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14994	15516	14995	14904	14780	14996	17559	15516	14905	14780
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,114.15	$ 2,187.74	$ 2,114.34	$ 2,101.46	$ 2,083.91	$ 2,114.45	$ 2,475.88	$ 2,187.74	$ 2,101.63	$ 2,083.91
Annual savings in carbon tax for electricity [$/year]	$ 7.5	$ 7.76	$ 7.5	$ 7.45	$ 7.39	$ 7.5	$ 8.78	$ 7.76	$ 7.45	$ 7.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,121.65	$ 2,195.5	$ 2,121.83	$ 2,108.92	$ 2,091.3	$ 2,121.95	$ 2,484.66	$ 2,195.5	$ 2,109.09	$ 2,091.3
Annual savings in GHG from electricity savings [kg CO2e/year]	164.9	170.7	164.9	163.9	162.6	165	193.2	170.7	164	162.6
Annual savings in natural gas [m3/year]	231.55	221.11	232.76	231.55	221.11	233.54	245.81	222.53	232.76	222.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,145.34	$ 2,048.61	$ 2,156.49	$ 2,145.34	$ 2,048.58	$ 2,163.74	$ 2,277.45	$ 2,061.7	$ 2,156.49	$ 2,061.66
Annual savings in carbon tax for natural gas [$/year]	$ 535.47	$ 511.32	$ 538.25	$ 535.47	$ 511.32	$ 540.06	$ 568.44	$ 514.59	$ 538.25	$ 514.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,680.8	$ 2,559.94	$ 2,694.74	$ 2,680.8	$ 2,559.89	$ 2,703.8	$ 2,845.89	$ 2,576.29	$ 2,694.74	$ 2,576.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	11899.3	11362.8	11961.1	11899.3	11362.6	12001.3	12632	11435.3	11961.1	11435.1
Net Present Value [$]	$ 9,402.12	$ 12,392.43	$ 9,685.04	$ 9,631.91	$ 10,597.83	$ 9,811.13	$ 14,935.17	$ 12,624.8	$ 9,914.46	$ 10,830.45
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	3.87	5.28	5.28	5.28	5.28	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 8,306.45	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 75	NA	NA	NA	NA	HRV sre 60	HRV sre 75	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,800.	$.	$.	$.	$.	$ 1,360.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$ 600.	$ 1,374.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$.	$ 850.	$.	$ 550.	$ 550.	$ 550.

LARGE 25SAR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,856.73	$ 35,362.14	$ 35,501.87	$ 35,662.14	$ 23,318.22	$ 23,406.73	$ 23,706.73	$ 23,868.22	$ 24,168.22	$ 24,656.73
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,736.68	$ 39,817.77	$ 39,975.11	$ 40,155.57	$ 26,256.32	$ 26,355.98	$ 26,693.78	$ 26,875.62	$ 27,213.42	$ 27,763.48
Net Present Value [$]	$ 9,402.12	$ 9,475.73	$ 9,526.49	$ 9,602.24	$ 9,631.91	$ 9,685.04	$ 9,811.13	$ 9,914.46	$ 10,040.74	$ 10,184.76
Incremental dollars per GHG saving	$ 1.95	$ 6.15	$ 6.16	$ 6.16	$ 1.99	$ 1.98	$ 2.	$ 2.02	$ 2.04	$ 2.1
Auxiliary Energy Required Heating [GJ/yr]	141	116.3	116.6	116.3	140	141	141	140.1	140.1	135.2
Annual Energy DHW [GJ/yr]	14.3	13	12.3	12.3	14.3	13	12.3	13	12.3	14.3
Annual Energy Space Heating [GJ/yr]	54.3	123.2	123.5	123.2	54	54.3	54.3	54	54	52.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.8	1.8	1.1	1.1	1.1	1.1	1.1	1.8
Total Energy [GJ/yr]	98.9	163.6	163.2	162.9	98.6	97.7	97	97.4	96.6	97.5
Design Heating Load [W]	22233.9	18240	18681.1	18240	22046.1	22233.9	22233.9	22046.1	22046.1	21367.1
Annual Energy Electricity [kWh/yr]	23521.8	8231.2	8233.1	8231.2	23431.8	23523.1	23523.9	23433	23433.8	23126.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,265.02	$ 1,101.4	$ 1,101.67	$ 1,101.4	$ 3,252.28	$ 3,265.2	$ 3,265.32	$ 3,252.45	$ 3,252.57	$ 3,209.1
Annual Energy Natural Gas [m3/yr]	382.7	3598.1	3586.9	3577.4	382.7	350.4	329.4	350.4	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 1,552.09	$ 1,547.26	$ 1,543.17	$ 165.08	$ 151.15	$ 142.09	$ 151.15	$ 142.09	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	50999	45834	51000	18103	17834	17835	18104	18105	17869
Upgrade Package List	Pkg2221101031	Pkg4321302034	Pkg3331203034	Pkg4321302034	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221101033
GHGI [kg/m2]	1.94	13.66	13.62	13.58	1.94	1.82	1.74	1.82	1.74	1.93
% ICC	2.0%	3.1%	3.1%	3.2%	2.1%	2.1%	2.1%	2.1%	2.1%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	76.7	63.2	63.4	63.2	76.1	76.7	76.7	76.1	76.1	73.5
Output: MEUI [kWh/(m2 * yr)]	39.5	75	74.8	74.6	39.3	38.9	38.4	38.7	38.3	38.7
Output: Better than ERS (%)	28630.0%	53910.0%	53750.0%	53630.0%	28520.0%	28160.0%	27890.0%	28050.0%	27730.0%	28090.0%
Output: Better than Envelope (%)	1170.0%	2710.0%	2690.0%	2710.0%	1230.0%	1170.0%	1170.0%	1220.0%	1220.0%	1530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	14994	297	295	297	14904	14995	14996	14905	14906	14599
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 2,114.15	$ 41.82	$ 41.55	$ 41.82	$ 2,101.46	$ 2,114.34	$ 2,114.45	$ 2,101.63	$ 2,101.75	$ 2,058.43
Annual savings in carbon tax for electricity [$/year]	$ 7.5	$ .15	$ .15	$ .15	$ 7.45	$ 7.5	$ 7.5	$ 7.45	$ 7.45	$ 7.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,121.65	$ 41.97	$ 41.7	$ 41.97	$ 2,108.92	$ 2,121.83	$ 2,121.95	$ 2,109.09	$ 2,109.2	$ 2,065.73
Annual savings in GHG from electricity savings [kg CO2e/year]	164.9	3.3	3.2	3.3	163.9	164.9	165	164	164	160.6
Annual savings in natural gas [m3/year]	231.55	111.75	112.17	112.52	231.55	232.76	233.54	232.76	233.54	231.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,145.34	$ 1,035.37	$ 1,039.24	$ 1,042.52	$ 2,145.34	$ 2,156.49	$ 2,163.74	$ 2,156.49	$ 2,163.74	$ 2,145.34
Annual savings in carbon tax for natural gas [$/year]	$ 535.47	$ 258.42	$ 259.39	$ 260.21	$ 535.47	$ 538.25	$ 540.06	$ 538.25	$ 540.06	$ 535.47
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,680.8	$ 1,293.79	$ 1,298.62	$ 1,302.72	$ 2,680.8	$ 2,694.74	$ 2,703.8	$ 2,694.74	$ 2,703.8	$ 2,680.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	11899.3	5742.7	5764.2	5782.4	11899.3	11961.1	12001.3	11961.1	12001.3	11899.3
Net Present Value [$]	$ 9,402.12	$ 9,475.73	$ 9,526.49	$ 9,602.24	$ 9,631.91	$ 9,685.04	$ 9,811.13	$ 9,914.46	$ 10,040.74	$ 10,184.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	14.09	10.47	10.47	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR80	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 638.99	$ 1,100.48	$ 2,431.7	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	7.04	7.04	7.04	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	BC EffR14	BC EffR10	BC EffR14	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$ 8,271.6	$ 6,283.57	$ 8,271.6	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	HRV sre 85	HRV sre 85	HRV sre 85	NA	NA	NA	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$.	$.	$.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 2,300.	$ 2,300.	$ 2,300.	$.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

LARGE 25SAR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 31,301.79	$ 31,340.3	$ 31,801.79	$ 31,851.79	$ 31,890.3	$ 32,151.79	$ 32,190.3	$ 32,193.01	$ 32,336.84	$ 32,351.79
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 35,245.82	$ 35,289.18	$ 35,808.82	$ 35,865.12	$ 35,908.48	$ 36,202.92	$ 36,246.28	$ 36,249.33	$ 36,411.28	$ 36,428.12
Net Present Value [$]	$ 17,010.98	$ 16,989.06	$ 17,217.75	$ 17,243.36	$ 17,221.43	$ 17,337.35	$ 17,315.43	$ 18,062.88	$ 17,780.13	$ 17,450.37
Incremental dollars per GHG saving	$ 2.79	$ 2.8	$ 2.84	$ 2.82	$ 2.83	$ 2.84	$ 2.84	$ 2.87	$ 2.88	$ 2.87
Auxiliary Energy Required Heating [GJ/yr]	126.9	126.7	125.7	126.9	126.7	126.9	126.7	127.4	126	125.7
Annual Energy DHW [GJ/yr]	24.7	24.7	24.7	23.3	23.3	22.4	22.4	24.7	24.7	23.3
Annual Energy Space Heating [GJ/yr]	49.2	49.1	48.8	49.2	49.1	49.2	49.1	49.4	48.8	48.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	104.9	104.8	104.5	103.5	103.4	102.6	102.5	105.1	104.5	103.1
Design Heating Load [W]	20502.1	20652.2	20464.4	20502.1	20652.2	20502.1	20652.2	20567.6	20487.9	20464.4
Annual Energy Electricity [kWh/yr]	22284.6	22261.1	22170.4	22284.6	22261.1	22284.6	22261.1	22347	22182	22170.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,089.96	$ 3,086.63	$ 3,073.8	$ 3,089.96	$ 3,086.63	$ 3,089.96	$ 3,086.63	$ 3,098.79	$ 3,075.44	$ 3,073.8
Annual Energy Natural Gas [m3/yr]	663.1	663.1	663.2	625.2	625.2	600.6	600.6	663.1	662.9	625.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.04	$ 286.04	$ 286.08	$ 269.69	$ 269.69	$ 259.08	$ 259.08	$ 286.04	$ 285.95	$ 269.73
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35884	35686	35902	35885	35687	35886	35688	36082	37612	35903
Upgrade Package List	Pkg3221202033	Pkg3221201034	Pkg3221202034	Pkg3221202033	Pkg3221201034	Pkg3221202033	Pkg3221201034	Pkg3221203032	Pkg3221201033	Pkg3221202034
GHGI [kg/m2]	2.96	2.96	2.96	2.82	2.82	2.73	2.73	2.97	2.96	2.82
% ICC	2.8%	2.8%	2.8%	2.8%	2.8%	2.9%	2.9%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69	68.9	68.3	69	68.9	69	68.9	69.3	68.5	68.3
Output: MEUI [kWh/(m2 * yr)]	42.8	42.7	42.5	42	42	41.5	41.5	42.9	42.6	41.8
Output: Better than ERS (%)	30980.0%	30940.0%	30820.0%	30430.0%	30390.0%	30080.0%	30040.0%	31050.0%	30820.0%	30270.0%
Output: Better than Envelope (%)	2050.0%	2060.0%	2120.0%	2050.0%	2060.0%	2050.0%	2060.0%	2020.0%	2110.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13757	13733	13643	13757	13733	13757	13733	13819	13654	13643
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,939.71	$ 1,936.4	$ 1,923.61	$ 1,939.71	$ 1,936.4	$ 1,939.71	$ 1,936.4	$ 1,948.51	$ 1,925.24	$ 1,923.61
Annual savings in carbon tax for electricity [$/year]	$ 6.88	$ 6.87	$ 6.82	$ 6.88	$ 6.87	$ 6.88	$ 6.87	$ 6.91	$ 6.83	$ 6.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,946.59	$ 1,943.26	$ 1,930.43	$ 1,946.59	$ 1,943.26	$ 1,946.59	$ 1,943.26	$ 1,955.42	$ 1,932.07	$ 1,930.43
Annual savings in GHG from electricity savings [kg CO2e/year]	151.3	151.1	150.1	151.3	151.1	151.3	151.1	152	150.2	150.1
Annual savings in natural gas [m3/year]	221.11	221.11	221.1	222.52	222.52	223.43	223.43	221.11	221.11	222.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,048.54	$ 2,048.54	$ 2,048.51	$ 2,061.63	$ 2,061.63	$ 2,070.12	$ 2,070.12	$ 2,048.54	$ 2,048.61	$ 2,061.59
Annual savings in carbon tax for natural gas [$/year]	$ 511.31	$ 511.31	$ 511.3	$ 514.57	$ 514.57	$ 516.69	$ 516.69	$ 511.31	$ 511.32	$ 514.56
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,559.85	$ 2,559.85	$ 2,559.81	$ 2,576.2	$ 2,576.2	$ 2,586.81	$ 2,586.81	$ 2,559.85	$ 2,559.94	$ 2,576.16
Annual savings in GHG from natural gas savings [kg CO2e/year]	11362.4	11362.4	11362.2	11434.9	11434.9	11482	11482	11362.4	11362.8	11434.7
Net Present Value [$]	$ 17,010.98	$ 16,989.06	$ 17,217.75	$ 17,243.36	$ 17,221.43	$ 17,337.35	$ 17,315.43	$ 18,062.88	$ 17,780.13	$ 17,450.37
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	14.09	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 2,431.7	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.

LARGE 25SAR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 31,301.79	$ 34,786.62	$ 34,808.11	$ 31,340.3	$ 31,851.79	$ 35,196.62	$ 31,890.3	$ 35,248.11	$ 35,286.62	$ 31,801.79
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 35,245.82	$ 39,169.73	$ 39,193.93	$ 35,289.18	$ 35,865.12	$ 39,631.39	$ 35,908.48	$ 39,689.37	$ 39,732.73	$ 35,808.82
Net Present Value [$]	$ 17,010.98	$ 20,382.43	$ 20,651.33	$ 16,989.06	$ 17,243.36	$ 20,402.25	$ 17,221.43	$ 20,608.39	$ 20,579.53	$ 17,217.75
Incremental dollars per GHG saving	$ 2.79	$ 2.79	$ 2.79	$ 2.8	$ 2.82	$ 2.83	$ 2.83	$ 2.83	$ 2.83	$ 2.84
Auxiliary Energy Required Heating [GJ/yr]	126.9	126.5	127.3	126.7	126.9	127.7	126.7	125.5	125.3	125.7
Annual Energy DHW [GJ/yr]	24.7	8.2	8.2	24.7	23.3	7.2	23.3	8.2	8.2	24.7
Annual Energy Space Heating [GJ/yr]	49.2	48.6	49	49.1	49.2	49.1	49.1	48.3	48.2	48.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	104.9	87.8	88.2	104.8	103.5	87.3	103.4	87.5	87.4	104.5
Design Heating Load [W]	20502.1	19576.5	19564.6	20652.2	20502.1	19752.4	20652.2	19388.7	19538.9	20464.4
Annual Energy Electricity [kWh/yr]	22284.6	24398.1	24494.2	22261.1	22284.6	24246.5	22261.1	24306.6	24280.4	22170.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,089.96	$ 3,389.02	$ 3,402.61	$ 3,086.63	$ 3,089.96	$ 3,367.56	$ 3,086.63	$ 3,376.07	$ 3,372.36	$ 3,073.8
Annual Energy Natural Gas [m3/yr]	663.1	0	0	663.1	625.2	0	625.2	0	0	663.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.04	$.	$.	$ 286.04	$ 269.69	$.	$ 269.69	$.	$.	$ 286.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	35884	43450	43648	35686	35885	43434	35687	43666	43468	35902
Upgrade Package List	Pkg3221202033	Pkg3221201033	Pkg3321202032	Pkg3221201034	Pkg3221202033	Pkg3321201032	Pkg3221201034	Pkg3321202033	Pkg3321201034	Pkg3221202034
GHGI [kg/m2]	2.96	0.53	0.53	2.96	2.82	0.52	2.82	0.52	0.52	2.96
% ICC	2.8%	3.1%	3.1%	2.8%	2.8%	3.1%	2.8%	3.1%	3.1%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	69	68.7	69.2	68.9	69	69.4	68.9	68.2	68.1	68.3
Output: MEUI [kWh/(m2 * yr)]	42.8	33.5	33.7	42.7	42	33.2	42	33.3	33.3	42.5
Output: Better than ERS (%)	30980.0%	24300.0%	24450.0%	30940.0%	30430.0%	24100.0%	30390.0%	24180.0%	24140.0%	30820.0%
Output: Better than Envelope (%)	2050.0%	2070.0%	2020.0%	2060.0%	2050.0%	2000.0%	2060.0%	2140.0%	2150.0%	2120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13757	15870	15966	13733	13757	15719	13733	15779	15753	13643
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,939.71	$ 2,237.71	$ 2,251.26	$ 1,936.4	$ 1,939.71	$ 2,216.34	$ 1,936.4	$ 2,224.81	$ 2,221.12	$ 1,923.61
Annual savings in carbon tax for electricity [$/year]	$ 6.88	$ 7.94	$ 7.98	$ 6.87	$ 6.88	$ 7.86	$ 6.87	$ 7.89	$ 7.88	$ 6.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,946.59	$ 2,245.65	$ 2,259.25	$ 1,943.26	$ 1,946.59	$ 2,224.2	$ 1,943.26	$ 2,232.7	$ 2,228.99	$ 1,930.43
Annual savings in GHG from electricity savings [kg CO2e/year]	151.3	174.6	175.6	151.1	151.3	172.9	151.1	173.6	173.3	150.1
Annual savings in natural gas [m3/year]	221.11	245.81	245.81	221.11	222.52	245.81	222.52	245.81	245.81	221.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,048.54	$ 2,277.45	$ 2,277.45	$ 2,048.54	$ 2,061.63	$ 2,277.45	$ 2,061.63	$ 2,277.45	$ 2,277.45	$ 2,048.51
Annual savings in carbon tax for natural gas [$/year]	$ 511.31	$ 568.44	$ 568.44	$ 511.31	$ 514.57	$ 568.44	$ 514.57	$ 568.44	$ 568.44	$ 511.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,559.85	$ 2,845.89	$ 2,845.89	$ 2,559.85	$ 2,576.2	$ 2,845.89	$ 2,576.2	$ 2,845.89	$ 2,845.89	$ 2,559.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	11362.4	12632	12632	11362.4	11434.9	12632	11434.9	12632	12632	11362.2
Net Present Value [$]	$ 17,010.98	$ 20,382.43	$ 20,651.33	$ 16,989.06	$ 17,243.36	$ 20,402.25	$ 17,221.43	$ 20,608.39	$ 20,579.53	$ 17,217.75
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48	$ 638.99	$ 638.99	$ 1,100.48	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	7.04	7.04	5.28	5.28	7.04	5.28	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 14,737.25	$ 14,737.25	$ 12,164.93	$ 12,164.93	$ 14,737.25	$ 12,164.93	$ 14,737.25	$ 14,737.25	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$ 1,374.	$ 1,374.	$.	$.	$ 1,374.	$.	$ 1,374.	$ 1,374.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$.	$.	$.

LARGE 25SAR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 34,012.62	$ 33,572.62	$ 34,512.62	$ 34,474.11	$ 34,034.11	$ 34,562.62	$ 34,122.62	$ 34,862.62	$ 34,422.62	$ 34,974.11
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 38,298.21	$ 37,802.77	$ 38,861.21	$ 38,817.85	$ 38,322.41	$ 38,917.51	$ 38,427.07	$ 39,255.31	$ 38,759.87	$ 39,380.85
Net Present Value [$]	$ 15,664.92	$ 15,697.81	$ 15,870.77	$ 15,911.87	$ 15,946.04	$ 15,947.29	$ 15,980.55	$ 16,073.56	$ 16,106.64	$ 16,113.52
Incremental dollars per GHG saving	$ 2.89	$ 2.86	$ 2.94	$ 2.93	$ 2.9	$ 2.93	$ 2.89	$ 2.94	$ 2.9	$ 2.98
Auxiliary Energy Required Heating [GJ/yr]	121.5	123.3	120.3	120.5	122.3	121.5	123.3	121.5	123.3	119.3
Annual Energy DHW [GJ/yr]	14.3	14.3	14.3	14.3	14.3	13	13	12.3	12.3	14.3
Annual Energy Space Heating [GJ/yr]	46.8	47.5	46.4	46.5	47.2	46.8	47.5	46.9	47.5	46.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	92.1	92.8	91.7	91.8	92.5	90.9	91.6	90.1	90.8	91.4
Design Heating Load [W]	19289.4	19465.3	19251.7	19101.6	19277.4	19289.4	19465.3	19289.4	19465.3	19063.9
Annual Energy Electricity [kWh/yr]	21621.1	21804.8	21506.9	21537.8	21722	21622.3	21806.1	21623.1	21806.9	21421.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,996.07	$ 3,022.06	$ 2,979.91	$ 2,984.28	$ 3,010.35	$ 2,996.24	$ 3,022.25	$ 2,996.35	$ 3,022.36	$ 2,967.88
Annual Energy Natural Gas [m3/yr]	382.7	382.7	382.7	382.7	382.7	350.4	350.4	329.4	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 165.08	$ 151.15	$ 151.15	$ 142.09	$ 142.09	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43447	43429	43465	43663	43645	43448	43430	43449	43431	43681
Upgrade Package List	Pkg3321201033	Pkg3321201032	Pkg3321201034	Pkg3321202033	Pkg3321202032	Pkg3321201033	Pkg3321201032	Pkg3321201033	Pkg3321201032	Pkg3321202034
GHGI [kg/m2]	1.9	1.9	1.9	1.9	1.9	1.78	1.78	1.7	1.7	1.9
% ICC	3.0%	3.0%	3.1%	3.1%	3.0%	3.1%	3.0%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	66	67	65.4	65.5	66.5	66	67	66.1	67	64.9
Output: MEUI [kWh/(m2 * yr)]	35.8	36.2	35.6	35.6	36	35.1	35.5	34.7	35.1	35.4
Output: Better than ERS (%)	25980.0%	26250.0%	25820.0%	25860.0%	26130.0%	25510.0%	25780.0%	25200.0%	25470.0%	25700.0%
Output: Better than Envelope (%)	2390.0%	2270.0%	2460.0%	2450.0%	2340.0%	2390.0%	2270.0%	2390.0%	2270.0%	2530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13093	13277	12979	13010	13194	13094	13278	13095	13279	12894
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,846.16	$ 1,872.06	$ 1,830.05	$ 1,834.41	$ 1,860.38	$ 1,846.32	$ 1,872.24	$ 1,846.44	$ 1,872.35	$ 1,818.07
Annual savings in carbon tax for electricity [$/year]	$ 6.55	$ 6.64	$ 6.49	$ 6.5	$ 6.6	$ 6.55	$ 6.64	$ 6.55	$ 6.64	$ 6.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,852.7	$ 1,878.7	$ 1,836.54	$ 1,840.91	$ 1,866.98	$ 1,852.87	$ 1,878.88	$ 1,852.98	$ 1,878.99	$ 1,824.52
Annual savings in GHG from electricity savings [kg CO2e/year]	144	146	142.8	143.1	145.1	144	146.1	144	146.1	141.8
Annual savings in natural gas [m3/year]	231.55	231.55	231.55	231.55	231.55	232.76	232.76	233.54	233.54	231.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,145.34	$ 2,145.34	$ 2,145.34	$ 2,145.34	$ 2,145.34	$ 2,156.49	$ 2,156.49	$ 2,163.74	$ 2,163.74	$ 2,145.34
Annual savings in carbon tax for natural gas [$/year]	$ 535.47	$ 535.47	$ 535.47	$ 535.47	$ 535.47	$ 538.25	$ 538.25	$ 540.06	$ 540.06	$ 535.47
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,680.8	$ 2,680.8	$ 2,680.8	$ 2,680.8	$ 2,680.8	$ 2,694.74	$ 2,694.74	$ 2,703.8	$ 2,703.8	$ 2,680.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	11899.3	11899.3	11899.3	11899.3	11899.3	11961.1	11961.1	12001.3	12001.3	11899.3
Net Present Value [$]	$ 15,664.92	$ 15,697.81	$ 15,870.77	$ 15,911.87	$ 15,946.04	$ 15,947.29	$ 15,980.55	$ 16,073.56	$ 16,106.64	$ 16,113.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	10.47	8.77	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48	$ 1,100.48	$ 638.99	$ 638.99	$ 638.99	$ 638.99	$ 1,100.48
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49	$ 3,963.49
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57	$ 6,283.57
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.

LARGE 25SAR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,756.57	$ 20,196.57	$ 20,218.07	$ 20,306.57	$ 20,354.61	$ 20,606.57	$ 20,658.07	$ 20,746.57	$ 20,768.07	$ 20,796.57
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,674.37	$ 30,335.25	$ 30,367.54	$ 30,500.47	$ 30,572.62	$ 30,951.07	$ 31,028.42	$ 31,161.35	$ 31,193.64	$ 31,236.45
Net Present Value [$]	$ 19,196.37	$ 18,933.41	$ 19,299.27	$ 19,364.44	$ 19,660.64	$ 19,412.33	$ 19,035.77	$ 19,102.22	$ 19,468.07	$ 17,452.49
Incremental dollars per GHG saving	$ 1.33	$ 1.36	$ 1.36	$ 1.36	$ 1.37	$ 1.37	$ 1.39	$ 1.39	$ 1.39	$ 1.35
Auxiliary Energy Required Heating [GJ/yr]	201.5	199.3	200.2	201.5	202.5	201.5	198	199.3	200.2	201.5
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	25	26.7	23.9	26.7	25	25	15.8
Annual Energy Space Heating [GJ/yr]	95.1	94.1	94.6	95.1	95.6	95.1	93.6	94.1	94.6	94.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	150.5	149.6	150	148.9	150.4	147.7	149.1	147.9	148.4	139.2
Design Heating Load [W]	28624.5	28415.6	28401.4	28624.5	28985.7	28624.5	28192.6	28415.6	28401.4	28007.3
Annual Energy Electricity [kWh/yr]	34405.8	34132.7	34266.5	34405.8	34355.1	34405.8	33993.2	34132.7	34266.5	34277.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,805.11	$ 4,766.46	$ 4,785.39	$ 4,805.11	$ 4,797.93	$ 4,805.11	$ 4,746.72	$ 4,766.46	$ 4,785.39	$ 4,786.89
Annual Energy Natural Gas [m3/yr]	716.7	716.7	716.7	671.1	716.3	641	716.7	671.2	671.2	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.16	$ 309.16	$ 309.16	$ 289.49	$ 308.99	$ 276.51	$ 309.16	$ 289.53	$ 289.53	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11476	11494	11746	11477	13348	11478	11764	11495	11747	11497
Upgrade Package List	Pkg2121101032	Pkg2121101033	Pkg2121102032	Pkg2121101032	Pkg2131102031	Pkg2121101032	Pkg2121102033	Pkg2121101033	Pkg2121102032	Pkg2121101033
GHGI [kg/m2]	3.43	3.42	3.42	3.26	3.42	3.14	3.42	3.25	3.25	2.33
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	109.6	108.3	108.8	109.6	110.1	109.6	107.6	108.3	108.8	109.6
Output: MEUI [kWh/(m2 * yr)]	67.8	67.3	67.5	66.9	67.7	66.3	67	66.3	66.6	61.6
Output: Better than ERS (%)	48790.0%	48440.0%	48590.0%	48160.0%	48750.0%	47700.0%	48240.0%	47770.0%	47970.0%	44380.0%
Output: Better than Envelope (%)	1100.0%	1190.0%	1150.0%	1100.0%	1050.0%	1100.0%	1250.0%	1190.0%	1150.0%	1100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25499	25226	25360	25499	25448	25499	25086	25226	25360	25370
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,595.34	$ 3,556.84	$ 3,575.7	$ 3,595.34	$ 3,588.2	$ 3,595.34	$ 3,537.17	$ 3,556.84	$ 3,575.7	$ 3,577.2
Annual savings in carbon tax for electricity [$/year]	$ 12.75	$ 12.61	$ 12.68	$ 12.75	$ 12.72	$ 12.75	$ 12.54	$ 12.61	$ 12.68	$ 12.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,608.09	$ 3,569.45	$ 3,588.38	$ 3,608.09	$ 3,600.92	$ 3,608.09	$ 3,549.71	$ 3,569.45	$ 3,588.38	$ 3,589.88
Annual savings in GHG from electricity savings [kg CO2e/year]	280.5	277.5	279	280.5	279.9	280.5	275.9	277.5	279	279.1
Annual savings in natural gas [m3/year]	294.49	294.49	294.49	296.19	294.51	297.32	294.49	296.19	296.19	305.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,728.49	$ 2,728.49	$ 2,728.49	$ 2,744.23	$ 2,728.63	$ 2,754.62	$ 2,728.49	$ 2,744.2	$ 2,744.2	$ 2,829.57
Annual savings in carbon tax for natural gas [$/year]	$ 681.02	$ 681.02	$ 681.02	$ 684.95	$ 681.05	$ 687.54	$ 681.02	$ 684.94	$ 684.94	$ 706.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,409.51	$ 3,409.51	$ 3,409.51	$ 3,429.18	$ 3,409.68	$ 3,442.16	$ 3,409.51	$ 3,429.14	$ 3,429.14	$ 3,535.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	15133.7	15133.7	15133.7	15221.1	15134.5	15278.7	15133.7	15220.9	15220.9	15694.4
Net Present Value [$]	$ 19,196.37	$ 18,933.41	$ 19,299.27	$ 19,364.44	$ 19,660.64	$ 19,412.33	$ 19,035.77	$ 19,102.22	$ 19,468.07	$ 17,452.49
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$.

LARGE 25SAR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,756.57	$ 20,796.57	$ 20,818.07	$ 20,196.57	$ 20,306.57	$ 20,218.07	$ 20,354.61	$ 20,606.57	$ 21,346.57	$ 21,258.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,674.37	$ 31,236.45	$ 31,268.74	$ 30,335.25	$ 30,500.47	$ 30,367.54	$ 30,572.62	$ 30,951.07	$ 32,062.55	$ 31,929.62
Net Present Value [$]	$ 19,196.37	$ 17,452.49	$ 17,811.96	$ 18,933.41	$ 19,364.44	$ 19,299.27	$ 19,660.64	$ 19,412.33	$ 17,682.15	$ 17,542.25
Incremental dollars per GHG saving	$ 1.33	$ 1.35	$ 1.35	$ 1.36	$ 1.36	$ 1.36	$ 1.37	$ 1.37	$ 1.38	$ 1.38
Auxiliary Energy Required Heating [GJ/yr]	201.5	201.5	202.5	199.3	201.5	200.2	202.5	201.5	201.6	200.2
Annual Energy DHW [GJ/yr]	26.7	15.8	15.8	26.7	25	26.7	26.7	23.9	14.3	15.8
Annual Energy Space Heating [GJ/yr]	95.1	94.6	95.1	94.1	95.1	94.6	95.6	95.1	94.7	94.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	150.5	139.2	139.7	149.6	148.9	150	150.4	147.7	137.7	138.7
Design Heating Load [W]	28624.5	28007.3	27993.1	28415.6	28624.5	28401.4	28985.7	28624.5	28007.3	27784.3
Annual Energy Electricity [kWh/yr]	34405.8	34277.1	34408.4	34132.7	34405.8	34266.5	34355.1	34405.8	34278.9	34132.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,805.11	$ 4,786.89	$ 4,805.47	$ 4,766.46	$ 4,805.11	$ 4,785.39	$ 4,797.93	$ 4,805.11	$ 4,787.15	$ 4,766.46
Annual Energy Natural Gas [m3/yr]	716.7	423.9	423.9	716.7	671.1	716.7	716.3	641	385.1	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.16	$ 182.86	$ 182.86	$ 309.16	$ 289.49	$ 309.16	$ 308.99	$ 276.51	$ 166.12	$ 182.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11476	11497	11749	11494	11477	11746	13348	11478	11498	11767
Upgrade Package List	Pkg2121101032	Pkg2121101033	Pkg2121102032	Pkg2121101033	Pkg2121101032	Pkg2121102032	Pkg2131102031	Pkg2121101032	Pkg2121101033	Pkg2121102033
GHGI [kg/m2]	3.43	2.33	2.33	3.42	3.26	3.42	3.42	3.14	2.18	2.32
% ICC	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	109.6	109.6	110.1	108.3	109.6	108.8	110.1	109.6	109.6	108.8
Output: MEUI [kWh/(m2 * yr)]	67.8	61.6	61.9	67.3	66.9	67.5	67.7	66.3	60.8	61.3
Output: Better than ERS (%)	48790.0%	44380.0%	44570.0%	48440.0%	48160.0%	48590.0%	48750.0%	47700.0%	43790.0%	44180.0%
Output: Better than Envelope (%)	1100.0%	1100.0%	1050.0%	1190.0%	1100.0%	1150.0%	1050.0%	1100.0%	1090.0%	1150.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25499	25370	25502	25226	25499	25360	25448	25499	25372	25226
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,595.34	$ 3,577.2	$ 3,595.71	$ 3,556.84	$ 3,595.34	$ 3,575.7	$ 3,588.2	$ 3,595.34	$ 3,577.45	$ 3,556.84
Annual savings in carbon tax for electricity [$/year]	$ 12.75	$ 12.69	$ 12.75	$ 12.61	$ 12.75	$ 12.68	$ 12.72	$ 12.75	$ 12.69	$ 12.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,608.09	$ 3,589.88	$ 3,608.46	$ 3,569.45	$ 3,608.09	$ 3,588.38	$ 3,600.92	$ 3,608.09	$ 3,590.14	$ 3,569.45
Annual savings in GHG from electricity savings [kg CO2e/year]	280.5	279.1	280.5	277.5	280.5	279	279.9	280.5	279.1	277.5
Annual savings in natural gas [m3/year]	294.49	305.4	305.4	294.49	296.19	294.49	294.51	297.32	306.85	305.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,728.49	$ 2,829.57	$ 2,829.57	$ 2,728.49	$ 2,744.23	$ 2,728.49	$ 2,728.63	$ 2,754.62	$ 2,842.96	$ 2,829.57
Annual savings in carbon tax for natural gas [$/year]	$ 681.02	$ 706.25	$ 706.25	$ 681.02	$ 684.95	$ 681.02	$ 681.05	$ 687.54	$ 709.59	$ 706.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,409.51	$ 3,535.81	$ 3,535.81	$ 3,409.51	$ 3,429.18	$ 3,409.51	$ 3,409.68	$ 3,442.16	$ 3,552.55	$ 3,535.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	15133.7	15694.4	15694.4	15133.7	15221.1	15133.7	15134.5	15278.7	15768.7	15694.4
Net Present Value [$]	$ 19,196.37	$ 17,452.49	$ 17,811.96	$ 18,933.41	$ 19,364.44	$ 19,299.27	$ 19,660.64	$ 19,412.33	$ 17,682.15	$ 17,542.25
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45	$ 8,306.45
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$ 600.	$ 600.	$.	$.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 850.	$ 550.	$.

LARGE 25SAR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 48,060.62	$ 48,522.12	$ 48,560.62	$ 48,610.62	$ 48,082.12	$ 48,910.62	$ 49,022.12	$ 48,170.62	$ 49,072.12	$ 49,110.62
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 72,187.05	$ 72,880.22	$ 72,938.05	$ 73,013.15	$ 72,219.34	$ 73,463.75	$ 73,631.22	$ 72,352.27	$ 73,706.32	$ 73,764.15
Net Present Value [$]	$ 12,436.2	$ 12,577.83	$ 12,612.57	$ 12,664.63	$ 12,673.87	$ 12,752.07	$ 12,755.12	$ 12,760.92	$ 12,807.24	$ 12,841.19
Incremental dollars per GHG saving	$ 6.13	$ 6.13	$ 6.13	$ 6.14	$ 6.17	$ 6.14	$ 6.14	$ 6.17	$ 6.14	$ 6.15
Auxiliary Energy Required Heating [GJ/yr]	146.8	145.6	145.5	146.9	147.7	146.9	144.3	149	145.6	145.6
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	15.8	13.4	15.8	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	155.5	154.2	154.2	155.6	156.5	155.6	152.8	157.9	154.2	154.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	198.7	197.4	197.4	197.3	199.7	196.4	196	199.6	196	195.9
Design Heating Load [W]	21073.4	20850.3	21028.6	21073.4	21059.2	21073.4	20805.6	21282.2	20850.3	21028.6
Annual Energy Electricity [kWh/yr]	8392.7	8385.9	8385.8	8392.8	8397.3	8392.8	8379	8404.2	8386	8385.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,124.25	$ 1,123.29	$ 1,123.28	$ 1,124.27	$ 1,124.9	$ 1,124.27	$ 1,122.31	$ 1,125.88	$ 1,123.3	$ 1,123.29
Annual Energy Natural Gas [m3/yr]	4525.7	4489.6	4489.2	4487.3	4550.1	4461.9	4453.2	4547.8	4451.3	4450.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,952.23	$ 1,936.66	$ 1,936.48	$ 1,935.66	$ 1,962.75	$ 1,924.71	$ 1,920.96	$ 1,961.76	$ 1,920.14	$ 1,919.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43546	43762	43564	43547	43744	43548	43780	43529	43763	43565
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321202052	Pkg3321201053	Pkg3321202054	Pkg3321201052	Pkg3321202053	Pkg3321201054
GHGI [kg/m2]	17.14	17	17	16.99	17.23	16.9	16.87	17.22	16.86	16.86
% ICC	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	79.8	79.1	79.1	79.8	80.3	79.8	78.4	81	79.1	79.1
Output: MEUI [kWh/(m2 * yr)]	94.1	93.4	93.4	93.3	94.6	92.8	92.6	94.6	92.6	92.6
Output: Better than ERS (%)	67620.0%	67110.0%	67110.0%	67070.0%	68010.0%	66720.0%	66560.0%	67970.0%	66560.0%	66520.0%
Output: Better than Envelope (%)	3510.0%	3570.0%	3570.0%	3510.0%	3470.0%	3510.0%	3620.0%	3420.0%	3570.0%	3570.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	514	521	521	514	510	514	528	503	521	521
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 72.5	$ 73.46	$ 73.48	$ 72.49	$ 71.85	$ 72.49	$ 74.43	$ 70.88	$ 73.45	$ 73.46
Annual savings in carbon tax for electricity [$/year]	$ .26	$ .26	$ .26	$ .26	$ .25	$ .26	$ .26	$ .25	$ .26	$ .26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 72.76	$ 73.72	$ 73.74	$ 72.75	$ 72.11	$ 72.75	$ 74.7	$ 71.13	$ 73.71	$ 73.72
Annual savings in GHG from electricity savings [kg CO2e/year]	5.7	5.7	5.7	5.7	5.6	5.7	5.8	5.5	5.7	5.7
Annual savings in natural gas [m3/year]	152.58	153.92	153.94	154.01	151.67	154.95	155.28	151.75	155.35	155.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,413.61	$ 1,426.07	$ 1,426.21	$ 1,426.87	$ 1,405.19	$ 1,435.63	$ 1,438.64	$ 1,405.98	$ 1,439.29	$ 1,439.47
Annual savings in carbon tax for natural gas [$/year]	$ 352.83	$ 355.94	$ 355.98	$ 356.14	$ 350.73	$ 358.33	$ 359.08	$ 350.93	$ 359.24	$ 359.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,766.44	$ 1,782.01	$ 1,782.19	$ 1,783.	$ 1,755.91	$ 1,793.96	$ 1,797.71	$ 1,756.91	$ 1,798.53	$ 1,798.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	7840.7	7909.8	7910.6	7914.2	7794	7962.8	7979.5	7798.4	7983.1	7984.1
Net Present Value [$]	$ 12,436.2	$ 12,577.83	$ 12,612.57	$ 12,664.63	$ 12,673.87	$ 12,752.07	$ 12,755.12	$ 12,760.92	$ 12,807.24	$ 12,841.19
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$ 550.

LARGE 25SAR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 25,551.59	$ 26,013.09	$ 26,101.59	$ 26,401.59	$ 26,563.09	$ 26,863.09	$ 30,398.55	$ 30,838.55	$ 30,860.05	$ 30,948.55
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,378.49	$ 39,071.66	$ 39,204.59	$ 39,655.19	$ 39,897.76	$ 40,348.36	$ 45,658.62	$ 46,319.5	$ 46,351.8	$ 46,484.72
Net Present Value [$]	$ 18,042.15	$ 18,148.52	$ 18,210.95	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 21,712.22	$ 21,462.23	$ 21,819.5	$ 21,880.29
Incremental dollars per GHG saving	$ 1.72	$ 1.75	$ 1.74	$ 1.76	$ 1.77	$ 1.79	$ 2.04	$ 2.07	$ 2.07	$ 2.07
Auxiliary Energy Required Heating [GJ/yr]	180.3	179	180.3	180.3	179	179	177.9	175.7	176.6	177.9
Annual Energy DHW [GJ/yr]	26.7	26.7	25	23.9	25	23.9	26.7	26.7	26.7	25
Annual Energy Space Heating [GJ/yr]	85.4	84.9	85.4	85.4	84.9	84.9	83.8	82.8	83.3	83.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	140.8	140.3	139.1	138	138.6	137.5	139.2	138.2	138.7	137.5
Design Heating Load [W]	26256.3	26033.3	26256.3	26256.3	26033.3	26033.3	25352.7	25143.9	25129.7	25352.7
Annual Energy Electricity [kWh/yr]	31707.1	31568.9	31707.1	31707.1	31568.9	31568.9	31249.3	30981.3	31111.7	31249.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,423.24	$ 4,403.68	$ 4,423.24	$ 4,423.24	$ 4,403.68	$ 4,403.68	$ 4,358.46	$ 4,320.54	$ 4,338.99	$ 4,358.46
Annual Energy Natural Gas [m3/yr]	716.5	716.6	671	640.9	671.1	640.9	716.7	716.7	716.7	671.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.07	$ 309.12	$ 289.45	$ 276.46	$ 289.49	$ 276.46	$ 309.16	$ 309.16	$ 309.16	$ 289.49
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	20998	21268	20999	21000	21269	21270	35650	35668	35866	35651
Upgrade Package List	Pkg2231101033	Pkg2231102033	Pkg2231101033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3221201032	Pkg3221201033	Pkg3221202032	Pkg3221201032
GHGI [kg/m2]	3.37	3.36	3.2	3.08	3.19	3.08	3.36	3.35	3.36	3.19
% ICC	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.7%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Chosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98	97.3	98	98	97.3	97.3	96.7	95.5	96	96.7
Output: MEUI [kWh/(m2 * yr)]	62.5	62.2	61.6	61	61.3	60.7	61.6	61.1	61.3	60.7
Output: Better than ERS (%)	45000.0%	44800.0%	44340.0%	43910.0%	44140.0%	43710.0%	44380.0%	43980.0%	44180.0%	43710.0%
Output: Better than Envelope (%)	2030.0%	2090.0%	2030.0%	2030.0%	2090.0%	2090.0%	2140.0%	2240.0%	2200.0%	2140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	22800	22662	22800	22800	22662	22662	22342	22074	22205	22342
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,214.83	$ 3,195.34	$ 3,214.83	$ 3,214.83	$ 3,195.34	$ 3,195.34	$ 3,150.28	$ 3,112.49	$ 3,130.88	$ 3,150.28
Annual savings in carbon tax for electricity [$/year]	$ 11.4	$ 11.33	$ 11.4	$ 11.4	$ 11.33	$ 11.33	$ 11.17	$ 11.04	$ 11.1	$ 11.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,226.23	$ 3,206.67	$ 3,226.23	$ 3,226.23	$ 3,206.67	$ 3,206.67	$ 3,161.45	$ 3,123.53	$ 3,141.98	$ 3,161.45
Annual savings in GHG from electricity savings [kg CO2e/year]	250.8	249.3	250.8	250.8	249.3	249.3	245.8	242.8	244.3	245.8
Annual savings in natural gas [m3/year]	294.5	294.5	296.2	297.32	296.19	297.32	294.49	294.49	294.49	296.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,728.56	$ 2,728.53	$ 2,744.27	$ 2,754.66	$ 2,744.23	$ 2,754.66	$ 2,728.49	$ 2,728.49	$ 2,728.49	$ 2,744.23
Annual savings in carbon tax for natural gas [$/year]	$ 681.04	$ 681.03	$ 684.96	$ 687.55	$ 684.95	$ 687.55	$ 681.02	$ 681.02	$ 681.02	$ 684.95
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,409.6	$ 3,409.55	$ 3,429.22	$ 3,442.21	$ 3,429.18	$ 3,442.21	$ 3,409.51	$ 3,409.51	$ 3,409.51	$ 3,429.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	15134.1	15133.9	15221.2	15278.9	15221.1	15278.9	15133.7	15133.7	15133.7	15221.1
Net Present Value [$]	$ 18,042.15	$ 18,148.52	$ 18,210.95	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 21,712.22	$ 21,462.23	$ 21,819.5	$ 21,880.29
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE 25SAR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,551.59	$ 26,101.59	$ 26,013.09	$ 26,401.59	$ 26,563.09	$ 26,863.09	$ 30,998.55	$ 31,548.55	$ 31,438.55	$ 31,460.05
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,378.49	$ 39,204.59	$ 39,071.66	$ 39,655.19	$ 39,897.76	$ 40,348.36	$ 46,559.82	$ 47,385.92	$ 47,220.7	$ 47,253.
Net Present Value [$]	$ 18,042.15	$ 18,210.95	$ 18,148.52	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 20,240.61	$ 20,470.27	$ 19,980.03	$ 20,336.76
Incremental dollars per GHG saving	$ 1.72	$ 1.74	$ 1.75	$ 1.76	$ 1.77	$ 1.79	$ 2.01	$ 2.03	$ 2.04	$ 2.04
Auxiliary Energy Required Heating [GJ/yr]	180.3	180.3	179	180.3	179	179	180.1	180.2	177.9	178.8
Annual Energy DHW [GJ/yr]	26.7	25	26.7	23.9	25	23.9	15.8	14.3	15.8	15.8
Annual Energy Space Heating [GJ/yr]	85.4	85.4	84.9	85.4	84.9	84.9	84.3	84.3	83.3	83.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	140.8	139.1	140.3	138	138.6	137.5	128.8	127.4	127.8	128.3
Design Heating Load [W]	26256.3	26256.3	26033.3	26256.3	26033.3	26033.3	24947.1	24947.1	24738.3	24724.1
Annual Energy Electricity [kWh/yr]	31707.1	31707.1	31568.9	31707.1	31568.9	31568.9	31397.3	31399.1	31125.2	31255.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,423.24	$ 4,423.24	$ 4,403.68	$ 4,423.24	$ 4,403.68	$ 4,403.68	$ 4,379.4	$ 4,379.66	$ 4,340.9	$ 4,359.32
Annual Energy Natural Gas [m3/yr]	716.5	671	716.6	640.9	671.1	640.9	423.9	385.1	423.9	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.07	$ 289.45	$ 309.12	$ 276.46	$ 289.49	$ 276.46	$ 182.86	$ 166.12	$ 182.86	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	20998	20999	21268	21000	21269	21270	35653	35654	35671	35869
Upgrade Package List	Pkg2231101033	Pkg2231101033	Pkg2231102033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3221201032	Pkg3221201032	Pkg3221201033	Pkg3221202032
GHGI [kg/m2]	3.37	3.2	3.36	3.08	3.19	3.08	2.26	2.12	2.26	2.26
% ICC	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.7%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98	98	97.3	98	97.3	97.3	97.9	97.9	96.7	97.2
Output: MEUI [kWh/(m2 * yr)]	62.5	61.6	62.2	61	61.3	60.7	56	55.2	55.4	55.7
Output: Better than ERS (%)	45000.0%	44340.0%	44800.0%	43910.0%	44140.0%	43710.0%	40310.0%	39770.0%	39920.0%	40120.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2090.0%	2030.0%	2090.0%	2090.0%	2040.0%	2040.0%	2140.0%	2100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	22800	22800	22662	22800	22662	22662	22490	22492	22218	22348
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,214.83	$ 3,214.83	$ 3,195.34	$ 3,214.83	$ 3,195.34	$ 3,195.34	$ 3,171.15	$ 3,171.4	$ 3,132.78	$ 3,151.14
Annual savings in carbon tax for electricity [$/year]	$ 11.4	$ 11.4	$ 11.33	$ 11.4	$ 11.33	$ 11.33	$ 11.25	$ 11.25	$ 11.11	$ 11.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,226.23	$ 3,226.23	$ 3,206.67	$ 3,226.23	$ 3,206.67	$ 3,206.67	$ 3,182.39	$ 3,182.65	$ 3,143.89	$ 3,162.31
Annual savings in GHG from electricity savings [kg CO2e/year]	250.8	250.8	249.3	250.8	249.3	249.3	247.4	247.4	244.4	245.8
Annual savings in natural gas [m3/year]	294.5	296.2	294.5	297.32	296.19	297.32	305.4	306.85	305.4	305.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,728.56	$ 2,744.27	$ 2,728.53	$ 2,754.66	$ 2,744.23	$ 2,754.66	$ 2,829.57	$ 2,842.96	$ 2,829.57	$ 2,829.57
Annual savings in carbon tax for natural gas [$/year]	$ 681.04	$ 684.96	$ 681.03	$ 687.55	$ 684.95	$ 687.55	$ 706.25	$ 709.59	$ 706.25	$ 706.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,409.6	$ 3,429.22	$ 3,409.55	$ 3,442.21	$ 3,429.18	$ 3,442.21	$ 3,535.81	$ 3,552.55	$ 3,535.81	$ 3,535.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	15134.1	15221.2	15133.9	15278.9	15221.1	15278.9	15694.4	15768.7	15694.4	15694.4
Net Present Value [$]	$ 18,042.15	$ 18,210.95	$ 18,148.52	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 20,240.61	$ 20,470.27	$ 19,980.03	$ 20,336.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	10.47	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$ 550.	$.	$.

LARGE 25SAR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 25,551.59	$ 26,013.09	$ 26,101.59	$ 26,401.59	$ 26,563.09	$ 26,863.09	$ 34,010.87	$ 34,472.37	$ 34,510.87	$ 34,560.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,378.49	$ 39,071.66	$ 39,204.59	$ 39,655.19	$ 39,897.76	$ 40,348.36	$ 51,084.33	$ 51,777.5	$ 51,835.33	$ 51,910.43
Net Present Value [$]	$ 18,042.15	$ 18,148.52	$ 18,210.95	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 18,809.54	$ 18,907.88	$ 18,968.47	$ 19,039.02
Incremental dollars per GHG saving	$ 1.72	$ 1.75	$ 1.74	$ 1.76	$ 1.77	$ 1.79	$ 2.2	$ 2.23	$ 2.23	$ 2.22
Auxiliary Energy Required Heating [GJ/yr]	180.3	179	180.3	180.3	179	179	166.7	165.4	165.4	166.7
Annual Energy DHW [GJ/yr]	26.7	26.7	25	23.9	25	23.9	15.8	15.8	15.8	14.3
Annual Energy Space Heating [GJ/yr]	85.4	84.9	85.4	85.4	84.9	84.9	78.1	77.6	77.6	78.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	140.8	140.3	139.1	138	138.6	137.5	122.6	122.1	122.1	121.2
Design Heating Load [W]	26256.3	26033.3	26256.3	26256.3	26033.3	26033.3	23416.2	23193.1	23371.4	23416.2
Annual Energy Electricity [kWh/yr]	31707.1	31568.9	31707.1	31707.1	31568.9	31568.9	29671.4	29530.3	29538.9	29673.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,423.24	$ 4,403.68	$ 4,423.24	$ 4,423.24	$ 4,403.68	$ 4,403.68	$ 4,135.19	$ 4,115.22	$ 4,116.44	$ 4,135.43
Annual Energy Natural Gas [m3/yr]	716.5	716.6	671	640.9	671.1	640.9	423.9	423.9	423.9	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.07	$ 309.12	$ 289.45	$ 276.46	$ 289.49	$ 276.46	$ 182.86	$ 182.86	$ 182.86	$ 166.12
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	20998	21268	20999	21000	21269	21270	43447	43663	43465	43448
Upgrade Package List	Pkg2231101033	Pkg2231102033	Pkg2231101033	Pkg2231101033	Pkg2231102033	Pkg2231102033	Pkg3321201033	Pkg3321202033	Pkg3321201034	Pkg3321201033
GHGI [kg/m2]	3.37	3.36	3.2	3.08	3.19	3.08	2.23	2.22	2.22	2.08
% ICC	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	3.0%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98	97.3	98	98	97.3	97.3	90.6	89.9	89.9	90.6
Output: MEUI [kWh/(m2 * yr)]	62.5	62.2	61.6	61	61.3	60.7	52.6	52.3	52.3	51.8
Output: Better than ERS (%)	45000.0%	44800.0%	44340.0%	43910.0%	44140.0%	43710.0%	37890.0%	37700.0%	37700.0%	37340.0%
Output: Better than Envelope (%)	2030.0%	2090.0%	2030.0%	2030.0%	2090.0%	2090.0%	2630.0%	2690.0%	2690.0%	2630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	22800	22662	22800	22800	22662	22662	20764	20623	20632	20766
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,214.83	$ 3,195.34	$ 3,214.83	$ 3,214.83	$ 3,195.34	$ 3,195.34	$ 2,927.79	$ 2,907.9	$ 2,909.11	$ 2,928.03
Annual savings in carbon tax for electricity [$/year]	$ 11.4	$ 11.33	$ 11.4	$ 11.4	$ 11.33	$ 11.33	$ 10.38	$ 10.31	$ 10.32	$ 10.38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,226.23	$ 3,206.67	$ 3,226.23	$ 3,226.23	$ 3,206.67	$ 3,206.67	$ 2,938.18	$ 2,918.21	$ 2,919.43	$ 2,938.42
Annual savings in GHG from electricity savings [kg CO2e/year]	250.8	249.3	250.8	250.8	249.3	249.3	228.4	226.9	227	228.4
Annual savings in natural gas [m3/year]	294.5	294.5	296.2	297.32	296.19	297.32	305.4	305.4	305.4	306.85
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,728.56	$ 2,728.53	$ 2,744.27	$ 2,754.66	$ 2,744.23	$ 2,754.66	$ 2,829.57	$ 2,829.57	$ 2,829.57	$ 2,842.96
Annual savings in carbon tax for natural gas [$/year]	$ 681.04	$ 681.03	$ 684.96	$ 687.55	$ 684.95	$ 687.55	$ 706.25	$ 706.25	$ 706.25	$ 709.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,409.6	$ 3,409.55	$ 3,429.22	$ 3,442.21	$ 3,429.18	$ 3,442.21	$ 3,535.81	$ 3,535.81	$ 3,535.81	$ 3,552.55
Annual savings in GHG from natural gas savings [kg CO2e/year]	15134.1	15133.9	15221.2	15278.9	15221.1	15278.9	15694.4	15694.4	15694.4	15768.7
Net Present Value [$]	$ 18,042.15	$ 18,148.52	$ 18,210.95	$ 18,258.84	$ 18,317.56	$ 18,364.48	$ 18,809.54	$ 18,907.88	$ 18,968.47	$ 19,039.02
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE 25SAR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 33,872.37	$ 33,910.87	$ 34,372.37	$ 34,422.37	$ 34,460.87	$ 34,722.37	$ 34,760.87	$ 34,763.62	$ 34,907.41	$ 34,922.37
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,876.3	$ 50,934.13	$ 51,627.3	$ 51,702.4	$ 51,760.23	$ 52,153.	$ 52,210.83	$ 52,214.96	$ 52,430.93	$ 52,453.4
Net Present Value [$]	$ 28,679.26	$ 28,887.26	$ 28,793.51	$ 28,832.29	$ 29,040.04	$ 28,868.53	$ 29,076.29	$ 29,755.29	$ 29,259.97	$ 28,946.3
Incremental dollars per GHG saving	$ 1.89	$ 1.89	$ 1.92	$ 1.91	$ 1.91	$ 1.92	$ 1.92	$ 1.94	$ 1.95	$ 1.94
Auxiliary Energy Required Heating [GJ/yr]	202.9	203.1	201.5	202.9	203.1	202.9	203.1	203.3	201.7	201.5
Annual Energy DHW [GJ/yr]	27.1	27.1	27.1	25.4	25.4	24.2	24.2	27.1	27.1	25.4
Annual Energy Space Heating [GJ/yr]	107.7	107.9	107.2	107.7	107.9	107.7	107.9	108	107.1	107.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	164.7	164.9	164.1	162.9	163.1	161.7	162	164.9	164	162.3
Design Heating Load [W]	25461	25651.8	25413.1	25461	25651.8	25461	25651.8	25544.3	25441	25413.1
Annual Energy Electricity [kWh/yr]	38199.4	38264.9	38049.2	38264.9	38199.4	38199.4	38264.9	38271.2	38023.9	38049.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,341.9	$ 5,351.17	$ 5,320.65	$ 5,341.9	$ 5,351.17	$ 5,341.9	$ 5,351.17	$ 5,352.06	$ 5,317.07	$ 5,320.65
Annual Energy Natural Gas [m3/yr]	728.6	728.7	728.7	681.2	681.3	649.7	649.8	728.6	728.3	681.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.29	$ 314.34	$ 314.34	$ 293.85	$ 293.89	$ 280.26	$ 280.3	$ 314.29	$ 314.16	$ 293.89
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43660	43462	43678	43661	43463	43662	43464	43858	45388	43679
Upgrade Package List	Pkg3321202033	Pkg3321201034	Pkg3321202034	Pkg3321202033	Pkg3321201034	Pkg3321202033	Pkg3321201034	Pkg3321203032	Pkg3331201033	Pkg3321202034
GHGI [kg/m2]	3.55	3.55	3.55	3.37	3.38	3.26	3.26	3.55	3.55	3.37
% ICC	3.0%	3.0%	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	110.3	110.4	109.5	110.3	110.4	110.3	110.4	110.5	109.6	109.5
Output: MEUI [kWh/(m2 * yr)]	75.3	75.5	75.1	74.4	74.5	73.7	73.9	75.5	75	74.1
Output: Better than ERS (%)	54340.0%	54410.0%	54100.0%	53630.0%	53710.0%	53160.0%	53280.0%	54410.0%	54060.0%	53400.0%
Output: Better than Envelope (%)	1030.0%	1030.0%	1100.0%	1030.0%	1030.0%	1030.0%	1030.0%	1020.0%	1090.0%	1100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28980	29045	28830	28980	29045	28980	29045	29052	28804	28830
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,086.17	$ 4,095.4	$ 4,064.99	$ 4,086.17	$ 4,095.4	$ 4,086.17	$ 4,095.4	$ 4,096.29	$ 4,061.42	$ 4,064.99
Annual savings in carbon tax for electricity [$/year]	$ 14.49	$ 14.52	$ 14.41	$ 14.49	$ 14.52	$ 14.49	$ 14.52	$ 14.53	$ 14.4	$ 14.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,100.66	$ 4,109.92	$ 4,079.4	$ 4,100.66	$ 4,109.92	$ 4,100.66	$ 4,109.92	$ 4,110.82	$ 4,075.82	$ 4,079.4
Annual savings in GHG from electricity savings [kg CO2e/year]	318.8	319.5	317.1	318.8	319.5	318.8	319.5	319.6	316.8	317.1
Annual savings in natural gas [m3/year]	354.97	354.96	354.96	356.73	356.73	357.91	357.9	354.97	354.98	356.73
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,288.76	$ 3,288.72	$ 3,288.72	$ 3,305.12	$ 3,305.09	$ 3,315.99	$ 3,315.96	$ 3,288.76	$ 3,288.86	$ 3,305.09
Annual savings in carbon tax for natural gas [$/year]	$ 820.86	$ 820.85	$ 820.85	$ 824.94	$ 824.93	$ 827.66	$ 827.65	$ 820.86	$ 820.88	$ 824.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,109.62	$ 4,109.57	$ 4,109.57	$ 4,130.06	$ 4,130.02	$ 4,143.65	$ 4,143.61	$ 4,109.62	$ 4,109.75	$ 4,130.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	18241.3	18241.1	18241.1	18332.1	18331.9	18392.4	18392.2	18241.3	18241.9	18331.9
Net Present Value [$]	$ 28,679.26	$ 28,887.26	$ 28,793.51	$ 28,832.29	$ 29,040.04	$ 28,868.53	$ 29,076.29	$ 29,755.29	$ 29,259.97	$ 28,946.3
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	14.09	8.77	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR80	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 2,431.75	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$ 550.

LARGE 25SAR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,872.37	$ 34,972.37	$ 33,910.87	$ 34,422.37	$ 35,522.37	$ 34,460.87	$ 34,372.37	$ 35,507.41	$ 34,722.37	$ 34,760.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,876.3	$ 52,528.5	$ 50,934.13	$ 51,702.4	$ 53,354.6	$ 51,760.23	$ 51,627.3	$ 53,332.13	$ 52,153.	$ 52,210.83
Net Present Value [$]	$ 28,679.26	$ 27,145.27	$ 28,887.26	$ 28,832.29	$ 27,362.08	$ 29,040.04	$ 28,793.51	$ 27,615.86	$ 28,868.53	$ 29,076.29
Incremental dollars per GHG saving	$ 1.89	$ 1.89	$ 1.89	$ 1.91	$ 1.91	$ 1.91	$ 1.92	$ 1.92	$ 1.92	$ 1.92
Auxiliary Energy Required Heating [GJ/yr]	202.9	203.4	203.1	202.9	203.4	203.1	201.5	203.5	202.9	203.1
Annual Energy DHW [GJ/yr]	27.1	16.2	27.1	25.4	14.7	25.4	27.1	16.2	24.2	24.2
Annual Energy Space Heating [GJ/yr]	107.7	107.5	107.9	107.7	107.5	107.9	107.2	107.4	107.7	107.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	164.7	153.5	164.9	162.9	152	163.1	164.1	153.4	161.7	162
Design Heating Load [W]	25461	24964.7	25651.8	25461	24964.7	25651.8	25413.1	24992.5	25461	25651.8
Annual Energy Electricity [kWh/yr]	38199.4	38134.5	38264.9	38199.4	38136.5	38264.9	38049.2	38109.4	38199.4	38264.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,341.9	$ 5,332.72	$ 5,351.17	$ 5,341.9	$ 5,333.	$ 5,351.17	$ 5,320.65	$ 5,329.17	$ 5,341.9	$ 5,351.17
Annual Energy Natural Gas [m3/yr]	728.6	434.1	728.7	681.2	393.7	681.3	728.7	434.1	649.7	649.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.29	$ 187.26	$ 314.34	$ 293.85	$ 169.83	$ 293.89	$ 314.34	$ 187.26	$ 280.26	$ 280.3
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43660	43681	43462	43661	43682	43463	43678	45391	43662	43464
Upgrade Package List	Pkg3321202033	Pkg3321202034	Pkg3321201034	Pkg3321202033	Pkg3321202034	Pkg3321201034	Pkg3321202034	Pkg3321201033	Pkg3321202033	Pkg3321201034
GHGI [kg/m2]	3.55	2.45	3.55	3.37	2.3	3.38	3.55	2.45	3.26	3.26
% ICC	3.0%	3.1%	3.0%	3.1%	3.2%	3.1%	3.0%	3.1%	3.1%	3.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	110.3	110.5	110.4	110.3	110.6	110.4	109.5	110.6	110.3	110.4
Output: MEUI [kWh/(m2 * yr)]	75.3	69.3	75.5	74.4	68.4	74.5	75.1	69.2	73.7	73.9
Output: Better than ERS (%)	54340.0%	49960.0%	54410.0%	53630.0%	49380.0%	53710.0%	54100.0%	49920.0%	53160.0%	53280.0%
Output: Better than Envelope (%)	1030.0%	1010.0%	1030.0%	1030.0%	1010.0%	1030.0%	1100.0%	1010.0%	1030.0%	1030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28980	28915	29045	28980	28917	29045	28830	28890	28980	29045
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,086.17	$ 4,077.01	$ 4,095.4	$ 4,086.17	$ 4,077.3	$ 4,095.4	$ 4,064.99	$ 4,073.48	$ 4,086.17	$ 4,095.4
Annual savings in carbon tax for electricity [$/year]	$ 14.49	$ 14.46	$ 14.52	$ 14.49	$ 14.46	$ 14.52	$ 14.41	$ 14.44	$ 14.49	$ 14.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,100.66	$ 4,091.47	$ 4,109.92	$ 4,100.66	$ 4,091.76	$ 4,109.92	$ 4,079.4	$ 4,087.92	$ 4,100.66	$ 4,109.92
Annual savings in GHG from electricity savings [kg CO2e/year]	318.8	318.1	319.5	318.8	318.1	319.5	317.1	317.8	318.8	319.5
Annual savings in natural gas [m3/year]	354.97	365.94	354.96	356.73	367.44	356.73	354.96	365.94	357.91	357.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,288.76	$ 3,390.42	$ 3,288.72	$ 3,305.12	$ 3,404.37	$ 3,305.09	$ 3,288.72	$ 3,390.42	$ 3,315.99	$ 3,315.96
Annual savings in carbon tax for natural gas [$/year]	$ 820.86	$ 846.23	$ 820.85	$ 824.94	$ 849.71	$ 824.93	$ 820.85	$ 846.23	$ 827.66	$ 827.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,109.62	$ 4,236.65	$ 4,109.57	$ 4,130.06	$ 4,254.08	$ 4,130.02	$ 4,109.57	$ 4,236.65	$ 4,143.65	$ 4,143.61
Annual savings in GHG from natural gas savings [kg CO2e/year]	18241.3	18805.2	18241.1	18332.1	18882.5	18331.9	18241.1	18805.2	18392.4	18392.2
Net Present Value [$]	$ 28,679.26	$ 27,145.27	$ 28,887.26	$ 28,832.29	$ 27,362.08	$ 29,040.04	$ 28,793.51	$ 27,615.86	$ 28,868.53	$ 29,076.29
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

LARGE 25SAR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 48,060.62	$ 48,522.12	$ 48,560.62	$ 48,610.62	$ 49,022.12	$ 49,072.12	$ 48,910.62	$ 49,372.12	$ 49,110.62	$ 49,572.12
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 72,187.05	$ 72,880.22	$ 72,938.05	$ 73,013.15	$ 73,631.22	$ 73,706.32	$ 73,463.75	$ 74,156.92	$ 73,764.15	$ 74,457.32
Net Present Value [$]	$ 6,907.98	$ 6,980.51	$ 7,072.34	$ 7,124.04	$ 7,144.51	$ 7,195.6	$ 7,201.66	$ 7,273.95	$ 7,287.25	$ 7,359.78
Incremental dollars per GHG saving	$ 5.32	$ 5.32	$ 5.33	$ 5.33	$ 5.33	$ 5.33	$ 5.34	$ 5.34	$ 5.35	$ 5.35
Auxiliary Energy Required Heating [GJ/yr]	182.7	181.2	181.4	182.8	179.8	181.2	182.8	181.2	181.4	179.8
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	14.7	16.2	14.7	13.7	13.7	14.7	14.7
Annual Energy Space Heating [GJ/yr]	193.6	191.9	192.1	193.6	190.5	191.9	193.6	191.9	192.1	190.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	237.1	235.5	235.7	235.7	234	234	234.7	233	234.2	232.6
Design Heating Load [W]	22743.4	22504.7	22695.5	22743.4	22456.8	22743.4	22504.7	22695.5	22695.5	22456.8
Annual Energy Electricity [kWh/yr]	8582.4	8574.1	8575.3	8582.5	8566.9	8574.2	8582.6	8574.3	8575.3	8567
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,151.09	$ 1,149.92	$ 1,150.09	$ 1,151.11	$ 1,148.9	$ 1,149.93	$ 1,151.12	$ 1,149.95	$ 1,150.09	$ 1,148.92
Annual Energy Natural Gas [m3/yr]	5538.4	5494.5	5500.5	5498.5	5456.6	5454.5	5471.9	5428	5460.5	5416.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,389.07	$ 2,370.14	$ 2,372.72	$ 2,371.86	$ 2,353.79	$ 2,352.88	$ 2,360.39	$ 2,341.45	$ 2,355.47	$ 2,336.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43546	43762	43564	43547	43780	43763	43548	43764	43565	43781
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321202054	Pkg3321202053	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321202054
GHGI [kg/m2]	20.94	20.77	20.79	20.79	20.63	20.62	20.69	20.52	20.65	20.48
% ICC	4.3%	4.3%	4.3%	4.3%	4.3%	4.4%	4.3%	4.4%	4.4%	4.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	99.3	98.5	98.6	99.3	97.7	98.5	99.4	98.5	98.6	97.8
Output: MEUI [kWh/(m2 * yr)]	115	114.1	114.2	114.2	113.3	113.3	113.6	112.7	113.4	112.5
Output: Better than ERS (%)	82620.0%	81990.0%	82070.0%	82070.0%	81410.0%	81410.0%	81680.0%	81020.0%	81480.0%	80860.0%
Output: Better than Envelope (%)	1930.0%	1990.0%	1980.0%	1920.0%	2050.0%	1990.0%	1920.0%	1990.0%	1980.0%	2050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	637	645	644	637	653	645	637	645	644	652
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 89.83	$ 91.	$ 90.83	$ 89.82	$ 92.02	$ 90.99	$ 89.8	$ 90.97	$ 90.83	$ 92.
Annual savings in carbon tax for electricity [$/year]	$ .32	$ .32	$ .32	$ .32	$ .33	$ .32	$ .32	$ .32	$ .32	$ .33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 90.15	$ 91.32	$ 91.15	$ 90.14	$ 92.34	$ 91.31	$ 90.12	$ 91.3	$ 91.15	$ 92.33
Annual savings in GHG from electricity savings [kg CO2e/year]	7	7.1	7.1	7	7.2	7.1	7	7.1	7.1	7.2
Annual savings in natural gas [m3/year]	175.76	177.39	177.17	177.24	178.81	178.88	178.24	179.87	178.66	180.3
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,628.4	$ 1,643.55	$ 1,641.48	$ 1,642.17	$ 1,656.63	$ 1,657.36	$ 1,651.35	$ 1,666.51	$ 1,655.29	$ 1,670.44
Annual savings in carbon tax for natural gas [$/year]	$ 406.44	$ 410.22	$ 409.71	$ 409.88	$ 413.49	$ 413.67	$ 412.17	$ 415.95	$ 413.15	$ 416.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,034.84	$ 2,053.77	$ 2,051.18	$ 2,052.05	$ 2,070.12	$ 2,071.03	$ 2,063.52	$ 2,082.46	$ 2,068.44	$ 2,087.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	9032	9116.1	9104.6	9108.4	9188.6	9192.6	9159.3	9243.4	9181.2	9265.2
Net Present Value [$]	$ 6,907.98	$ 6,980.51	$ 7,072.34	$ 7,124.04	$ 7,144.51	$ 7,195.6	$ 7,201.66	$ 7,273.95	$ 7,287.25	$ 7,359.78
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

LARGE 25SAR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 50,610.62	$ 51,072.12	$ 51,110.62	$ 51,160.62	$ 51,460.62	$ 51,572.12	$ 51,622.12	$ 51,660.62	$ 51,667.16	$ 51,672.12
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 76,017.15	$ 76,710.32	$ 76,768.15	$ 76,843.25	$ 77,293.85	$ 77,461.32	$ 77,536.42	$ 77,594.25	$ 77,604.07	$ 77,611.52
Net Present Value [$]	$ 37,375.97	$ 37,287.16	$ 37,499.54	$ 37,529.	$ 37,565.01	$ 37,414.2	$ 37,440.19	$ 37,652.33	$ 38,349.75	$ 35,636.91
Incremental dollars per GHG saving	$ 2.82	$ 2.84	$ 2.85	$ 2.84	$ 2.84	$ 2.87	$ 2.86	$ 2.86	$ 2.88	$ 2.79
Auxiliary Energy Required Heating [GJ/yr]	180.4	178.8	179.1	180.4	180.4	177.5	178.8	179.1	180.2	180.7
Annual Energy DHW [GJ/yr]	27.1	27.1	27.1	25.4	24.2	27.1	25.4	25.4	27.1	16.2
Annual Energy Space Heating [GJ/yr]	96.1	95.3	95.6	96.1	96.1	94.8	95.3	95.6	96	95.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	153.4	152.6	152.9	151.6	150.5	152.1	150.9	151.1	153.3	142
Design Heating Load [W]	23284.7	23046	23236.8	23284.7	23284.7	22998.1	23046	23236.8	23249.4	22597.6
Annual Energy Electricity [kWh/yr]	35075.2	34861.4	34928.6	35075.2	35075.2	34715.9	34861.4	34928.6	35044	34946.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,899.83	$ 4,869.57	$ 4,879.08	$ 4,899.83	$ 4,899.83	$ 4,848.98	$ 4,869.57	$ 4,879.08	$ 4,895.41	$ 4,881.57
Annual Energy Natural Gas [m3/yr]	728.8	728.8	728.9	681.4	649.9	729	681.4	681.5	728.5	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.38	$ 314.38	$ 314.42	$ 293.93	$ 280.34	$ 314.47	$ 293.93	$ 293.98	$ 314.25	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43552	43768	43570	43553	43554	43786	43769	43571	45478	43771
Upgrade Package List	Pkg3321201053	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321201053	Pkg3321202054	Pkg3321202053	Pkg3321201054	Pkg3331201052	Pkg3321202053
GHGI [kg/m2]	3.49	3.48	3.48	3.31	3.19	3.48	3.3	3.31	3.48	2.38
% ICC	4.5%	4.5%	4.5%	4.5%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98.1	97.2	97.3	98.1	98.1	96.5	97.2	97.3	97.9	98.2
Output: MEUI [kWh/(m2 * yr)]	69.2	68.8	68.9	68.2	67.6	68.5	67.8	68	69.1	63
Output: Better than ERS (%)	49920.0%	49610.0%	49730.0%	49220.0%	48790.0%	49410.0%	48950.0%	49020.0%	49880.0%	45470.0%
Output: Better than Envelope (%)	2030.0%	2100.0%	2090.0%	2030.0%	2030.0%	2160.0%	2100.0%	2090.0%	2040.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25856	25642	25709	25856	25856	25496	25642	25709	25824	25727
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,645.65	$ 3,615.51	$ 3,624.98	$ 3,645.65	$ 3,645.65	$ 3,594.99	$ 3,615.51	$ 3,624.98	$ 3,641.25	$ 3,627.46
Annual savings in carbon tax for electricity [$/year]	$ 12.93	$ 12.82	$ 12.85	$ 12.93	$ 12.93	$ 12.75	$ 12.82	$ 12.85	$ 12.91	$ 12.86
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,658.58	$ 3,628.33	$ 3,637.84	$ 3,658.58	$ 3,658.58	$ 3,607.74	$ 3,628.33	$ 3,637.84	$ 3,654.17	$ 3,640.33
Annual savings in GHG from electricity savings [kg CO2e/year]	284.4	282.1	282.8	284.4	284.4	280.5	282.1	282.8	284.1	283
Annual savings in natural gas [m3/year]	354.96	354.96	354.95	356.72	357.9	354.95	356.72	356.72	354.97	365.94
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,288.69	$ 3,288.69	$ 3,288.65	$ 3,305.05	$ 3,315.93	$ 3,288.62	$ 3,305.05	$ 3,305.02	$ 3,288.79	$ 3,390.42
Annual savings in carbon tax for natural gas [$/year]	$ 820.84	$ 820.84	$ 820.83	$ 824.93	$ 827.64	$ 820.82	$ 824.93	$ 824.92	$ 820.87	$ 846.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,109.53	$ 4,109.53	$ 4,109.49	$ 4,129.98	$ 4,143.56	$ 4,109.44	$ 4,129.98	$ 4,129.93	$ 4,109.66	$ 4,236.65
Annual savings in GHG from natural gas savings [kg CO2e/year]	18240.9	18240.9	18240.7	18331.7	18392	18240.5	18331.7	18331.5	18241.5	18805.2
Net Present Value [$]	$ 37,375.97	$ 37,287.16	$ 37,499.54	$ 37,529.	$ 37,565.01	$ 37,414.2	$ 37,440.19	$ 37,652.33	$ 38,349.75	$ 35,636.91
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$ 550.	$ 550.	$.	$.

LARGE 25SAR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 51,672.12	$ 51,710.62	$ 52,222.12	$ 52,260.62	$ 52,172.12	$ 52,522.12	$ 52,560.62	$ 50,610.62	$ 52,722.12	$ 51,160.62
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 77,611.52	$ 77,669.35	$ 78,437.62	$ 78,495.45	$ 78,362.52	$ 78,888.22	$ 78,946.05	$ 76,017.15	$ 79,188.62	$ 76,843.25
Net Present Value [$]	$ 35,636.91	$ 35,847.96	$ 35,853.72	$ 36,064.58	$ 35,758.05	$ 35,931.83	$ 36,142.87	$ 37,375.97	$ 35,974.67	$ 37,529.
Incremental dollars per GHG saving	$ 2.79	$ 2.79	$ 2.81	$ 2.81	$ 2.82	$ 2.82	$ 2.82	$ 2.82	$ 2.83	$ 2.84
Auxiliary Energy Required Heating [GJ/yr]	180.7	180.9	180.7	180.9	179.3	180.7	180.9	180.4	179.3	180.4
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	14.7	16.2	13.7	13.7	27.1	14.7	25.4
Annual Energy Space Heating [GJ/yr]	95.7	95.9	95.7	95.9	95.1	95.7	95.9	96.1	95.1	96.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	142	142.2	140.5	140.7	141.4	139.5	139.7	153.4	139.9	151.6
Design Heating Load [W]	22597.6	22788.4	22597.6	22788.4	22549.7	22597.6	22788.4	23284.7	22549.7	23284.7
Annual Energy Electricity [kWh/yr]	34946.2	35013.2	34948.2	35015.2	34799	34949.5	35016.5	35075.2	34801	35075.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,881.57	$ 4,891.05	$ 4,881.86	$ 4,891.34	$ 4,860.74	$ 4,882.04	$ 4,891.52	$ 4,899.83	$ 4,861.03	$ 4,899.83
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	393.7	434.1	366.8	366.8	728.8	393.7	681.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 169.83	$ 187.26	$ 158.22	$ 158.22	$ 314.38	$ 169.83	$ 293.93
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43771	43573	43772	43574	43789	43773	43575	43552	43790	43553
Upgrade Package List	Pkg3321202053	Pkg3321201054	Pkg3321202053	Pkg3321201054	Pkg3321202054	Pkg3321202053	Pkg3321201054	Pkg3321201053	Pkg3321202054	Pkg3321201053
GHGI [kg/m2]	2.38	2.38	2.23	2.23	2.38	2.13	2.13	3.49	2.22	3.31
% ICC	4.6%	4.6%	4.6%	4.6%	4.6%	4.7%	4.7%	4.5%	4.7%	4.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98.2	98.3	98.2	98.3	97.5	98.2	98.3	98.1	97.5	98.1
Output: MEUI [kWh/(m2 * yr)]	63	63.1	62.2	62.3	62.7	61.6	61.8	69.2	61.9	68.2
Output: Better than ERS (%)	45470.0%	45550.0%	44880.0%	44960.0%	45230.0%	44490.0%	44570.0%	49920.0%	44650.0%	49220.0%
Output: Better than Envelope (%)	2020.0%	2010.0%	2020.0%	2010.0%	2080.0%	2020.0%	2010.0%	2030.0%	2080.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25727	25794	25729	25796	25580	25730	25797	25856	25582	25856
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,627.46	$ 3,636.91	$ 3,627.75	$ 3,637.19	$ 3,606.71	$ 3,627.93	$ 3,637.38	$ 3,645.65	$ 3,606.99	$ 3,645.65
Annual savings in carbon tax for electricity [$/year]	$ 12.86	$ 12.9	$ 12.86	$ 12.9	$ 12.79	$ 12.86	$ 12.9	$ 12.93	$ 12.79	$ 12.93
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,640.33	$ 3,649.81	$ 3,640.61	$ 3,650.09	$ 3,619.5	$ 3,640.79	$ 3,650.28	$ 3,658.58	$ 3,619.78	$ 3,658.58
Annual savings in GHG from electricity savings [kg CO2e/year]	283	283.7	283	283.8	281.4	283	283.8	284.4	281.4	284.4
Annual savings in natural gas [m3/year]	365.94	365.94	367.44	367.44	365.94	368.45	368.45	354.96	367.44	356.72
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,390.42	$ 3,390.42	$ 3,404.37	$ 3,404.37	$ 3,390.42	$ 3,413.65	$ 3,413.65	$ 3,288.69	$ 3,404.37	$ 3,305.05
Annual savings in carbon tax for natural gas [$/year]	$ 846.23	$ 846.23	$ 849.71	$ 849.71	$ 846.23	$ 852.03	$ 852.03	$ 820.84	$ 849.71	$ 824.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,236.65	$ 4,236.65	$ 4,254.08	$ 4,254.08	$ 4,236.65	$ 4,265.68	$ 4,265.68	$ 4,109.53	$ 4,254.08	$ 4,129.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	18805.2	18805.2	18882.5	18882.5	18805.2	18934	18934	18240.9	18882.5	18331.7
Net Present Value [$]	$ 35,636.91	$ 35,847.96	$ 35,853.72	$ 36,064.58	$ 35,758.05	$ 35,931.83	$ 36,142.87	$ 37,375.97	$ 35,974.67	$ 37,529.
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.	$ 550.	$ 550.

LARGE 25SAR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 51,672.12	$ 52,172.12	$ 54,660.12	$ 51,710.62	$ 52,222.12	$ 55,160.12	$ 52,522.12	$ 52,722.12	$ 55,210.12	$ 53,022.12
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 77,611.52	$ 78,362.52	$ 82,099.5	$ 77,669.35	$ 78,437.62	$ 82,850.5	$ 78,888.22	$ 79,188.62	$ 82,925.6	$ 79,639.22
Net Present Value [$]	$ 35,636.91	$ 35,758.05	$ 35,794.48	$ 35,847.96	$ 35,853.72	$ 35,899.	$ 35,931.83	$ 35,974.67	$ 36,011.1	$ 36,052.78
Incremental dollars per GHG saving	$ 2.79	$ 2.82	$ 2.95	$ 2.79	$ 2.81	$ 2.98	$ 2.82	$ 2.83	$ 2.97	$ 2.84
Auxiliary Energy Required Heating [GJ/yr]	180.7	179.3	174	180.9	180.7	172.6	180.7	179.3	174	179.4
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	14.7	16.2	13.7	14.7	14.7	13.7
Annual Energy Space Heating [GJ/yr]	95.7	95.1	91.7	95.9	95.7	91.2	95.7	95.1	91.7	95.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	142	141.4	138	142.2	140.5	137.5	139.5	139.9	136.5	138.9
Design Heating Load [W]	22597.6	22549.7	21401.8	22788.4	22597.6	21353.9	22597.6	22549.7	21401.8	22549.7
Annual Energy Electricity [kWh/yr]	34946.2	34799	33846.7	35013.2	34948.2	33693.1	34949.5	34801	33848.7	34802.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,881.57	$ 4,860.74	$ 4,725.99	$ 4,891.05	$ 4,881.86	$ 4,704.26	$ 4,882.04	$ 4,861.03	$ 4,726.28	$ 4,861.21
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	393.7	434.1	366.8	393.7	393.7	366.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 158.22	$ 169.83	$ 169.83	$ 158.22
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43771	43789	51061	43573	43772	51079	43773	43790	51062	43791
Upgrade Package List	Pkg3321202053	Pkg3321202054	Pkg4321302053	Pkg3321201054	Pkg3321202053	Pkg4321302054	Pkg3321202053	Pkg3321202054	Pkg4321302053	Pkg3321202054
GHGI [kg/m2]	2.38	2.38	2.36	2.38	2.23	2.35	2.13	2.22	2.2	2.12
% ICC	4.6%	4.6%	4.8%	4.6%	4.6%	4.9%	4.7%	4.7%	4.9%	4.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	98.2	97.5	94.6	98.3	98.2	93.8	98.2	97.5	94.6	97.5
Output: MEUI [kWh/(m2 * yr)]	63	62.7	60.8	63.1	62.2	60.5	61.6	61.9	60	61.3
Output: Better than ERS (%)	45470.0%	45230.0%	43910.0%	45550.0%	44880.0%	43710.0%	44490.0%	44650.0%	43320.0%	44260.0%
Output: Better than Envelope (%)	2020.0%	2080.0%	2310.0%	2010.0%	2020.0%	2370.0%	2020.0%	2080.0%	2310.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25727	25580	24627	25794	25729	24474	25730	25582	24629	25583
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,627.46	$ 3,606.71	$ 3,472.44	$ 3,636.91	$ 3,627.75	$ 3,450.78	$ 3,627.93	$ 3,606.99	$ 3,472.72	$ 3,607.17
Annual savings in carbon tax for electricity [$/year]	$ 12.86	$ 12.79	$ 12.31	$ 12.9	$ 12.86	$ 12.24	$ 12.86	$ 12.79	$ 12.31	$ 12.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,640.33	$ 3,619.5	$ 3,484.75	$ 3,649.81	$ 3,640.61	$ 3,463.01	$ 3,640.79	$ 3,619.78	$ 3,485.03	$ 3,619.97
Annual savings in GHG from electricity savings [kg CO2e/year]	283	281.4	270.9	283.7	283	269.2	283	281.4	270.9	281.4
Annual savings in natural gas [m3/year]	365.94	365.94	365.94	365.94	367.44	365.94	368.45	367.44	367.44	368.45
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,390.42	$ 3,390.42	$ 3,390.42	$ 3,390.42	$ 3,404.37	$ 3,390.42	$ 3,413.65	$ 3,404.37	$ 3,404.37	$ 3,413.65
Annual savings in carbon tax for natural gas [$/year]	$ 846.23	$ 846.23	$ 846.23	$ 846.23	$ 849.71	$ 846.23	$ 852.03	$ 849.71	$ 849.71	$ 852.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,236.65	$ 4,236.65	$ 4,236.65	$ 4,236.65	$ 4,254.08	$ 4,236.65	$ 4,265.68	$ 4,254.08	$ 4,254.08	$ 4,265.68
Annual savings in GHG from natural gas savings [kg CO2e/year]	18805.2	18805.2	18805.2	18805.2	18882.5	18805.2	18934	18882.5	18882.5	18934
Net Present Value [$]	$ 35,636.91	$ 35,758.05	$ 35,794.48	$ 35,847.96	$ 35,853.72	$ 35,899.	$ 35,931.83	$ 35,974.67	$ 36,011.1	$ 36,052.78
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	8.77	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.

LARGE 25SAR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 30,838.55	$ 30,860.05	$ 31,300.05	$ 31,338.55	$ 31,388.55	$ 31,410.05	$ 31,438.55	$ 31,688.55	$ 31,710.05	$ 31,800.05
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 46,319.5	$ 46,351.8	$ 47,012.68	$ 47,070.5	$ 47,145.6	$ 47,177.9	$ 47,220.7	$ 47,596.2	$ 47,628.5	$ 47,763.68
Net Present Value [$]	$ 45,490.36	$ 45,982.56	$ 45,288.89	$ 45,654.28	$ 45,630.05	$ 46,122.25	$ 43,553.69	$ 45,656.83	$ 46,148.3	$ 45,420.86
Incremental dollars per GHG saving	$ 1.51	$ 1.51	$ 1.53	$ 1.53	$ 1.53	$ 1.53	$ 1.5	$ 1.54	$ 1.54	$ 1.56
Auxiliary Energy Required Heating [GJ/yr]	252.2	253.3	250.4	250.9	252.2	253.3	253.5	252.2	253.3	249.2
Annual Energy DHW [GJ/yr]	27.5	27.5	27.5	27.5	25.7	25.7	16.5	24.5	24.5	27.5
Annual Energy Space Heating [GJ/yr]	153.5	154.2	152.6	153.1	153.5	154.2	153.5	153.5	154.2	152.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	210	210.6	209	209.5	208.1	208.8	198.8	206.9	207.6	208.5
Design Heating Load [W]	28459.9	28443.9	28209.4	28409.6	28459.9	28443.9	27970.3	28459.9	28443.9	28159.2
Annual Energy Electricity [kWh/yr]	50673.6	50856.5	50415.8	50542.4	50673.6	50856.5	50653.6	50673.6	50856.5	50272.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,107.	$ 7,132.88	$ 7,070.52	$ 7,088.43	$ 7,107.	$ 7,132.88	$ 7,104.17	$ 7,107.	$ 7,132.88	$ 7,050.24
Annual Energy Natural Gas [m3/yr]	739.3	739.3	739.4	739.5	690.3	690.3	442.6	657.7	657.6	739.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.91	$ 318.91	$ 318.95	$ 318.99	$ 297.77	$ 297.77	$ 190.92	$ 283.71	$ 283.67	$ 318.99
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	35668	35866	35884	35686	35669	35867	35671	35670	35868	35902
Upgrade Package List	Pkg3221201033	Pkg3221202032	Pkg3221202033	Pkg3221201034	Pkg3221201033	Pkg3221202032	Pkg3221201033	Pkg3221201033	Pkg3221202032	Pkg3221202034
GHGI [kg/m2]	3.86	3.86	3.86	3.86	3.68	3.68	2.75	3.56	3.56	3.85
% ICC	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	137.1	137.7	136.1	136.4	137.1	137.7	137.8	137.1	137.7	135.5
Output: MEUI [kWh/(m2 * yr)]	100.1	100.4	99.6	99.8	99.1	99.4	94	98.4	98.8	99.3
Output: Better than ERS (%)	72030.0%	72270.0%	71640.0%	71840.0%	71290.0%	71560.0%	67660.0%	70820.0%	71090.0%	71450.0%
Output: Better than Envelope (%)	1050.0%	1010.0%	1120.0%	1100.0%	1050.0%	1010.0%	1010.0%	1050.0%	1010.0%	1160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	41188	41371	40930	41056	41188	41371	41168	41188	41371	40787
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,807.47	$ 5,833.25	$ 5,771.12	$ 5,788.97	$ 5,807.47	$ 5,833.25	$ 5,804.65	$ 5,807.47	$ 5,833.25	$ 5,750.91
Annual savings in carbon tax for electricity [$/year]	$ 20.59	$ 20.69	$ 20.46	$ 20.53	$ 20.59	$ 20.69	$ 20.58	$ 20.59	$ 20.69	$ 20.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,828.06	$ 5,853.94	$ 5,791.58	$ 5,809.49	$ 5,828.06	$ 5,853.94	$ 5,825.23	$ 5,828.06	$ 5,853.94	$ 5,771.3
Annual savings in GHG from electricity savings [kg CO2e/year]	453.1	455.1	450.2	451.6	453.1	455.1	452.8	453.1	455.1	448.7
Annual savings in natural gas [m3/year]	406.49	406.49	406.49	406.48	408.32	408.32	417.55	409.53	409.54	406.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,766.14	$ 3,766.14	$ 3,766.11	$ 3,766.07	$ 3,783.05	$ 3,783.05	$ 3,868.56	$ 3,794.31	$ 3,794.34	$ 3,766.07
Annual savings in carbon tax for natural gas [$/year]	$ 940.01	$ 940.01	$ 940.	$ 939.99	$ 944.23	$ 944.23	$ 965.57	$ 947.04	$ 947.05	$ 939.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,706.15	$ 4,706.15	$ 4,706.11	$ 4,706.06	$ 4,727.29	$ 4,727.29	$ 4,834.14	$ 4,741.35	$ 4,741.39	$ 4,706.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	20889.1	20889.1	20888.9	20888.7	20982.9	20982.9	21457.2	21045.4	21045.6	20888.7
Net Present Value [$]	$ 45,490.36	$ 45,982.56	$ 45,288.89	$ 45,654.28	$ 45,630.05	$ 46,122.25	$ 43,553.69	$ 45,656.83	$ 46,148.3	$ 45,420.86
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.

LARGE 25SAR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 31,438.55	$ 30,838.55	$ 30,860.05	$ 31,988.55	$ 31,900.05	$ 31,938.55	$ 32,288.55	$ 31,388.55	$ 31,410.05	$ 31,300.05
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 47,220.7	$ 46,319.5	$ 46,351.8	$ 48,046.8	$ 47,913.88	$ 47,971.7	$ 48,497.4	$ 47,145.6	$ 47,177.9	$ 47,012.68
Net Present Value [$]	$ 43,553.69	$ 45,490.36	$ 45,982.56	$ 43,758.43	$ 43,308.95	$ 43,715.	$ 43,829.93	$ 45,630.05	$ 46,122.25	$ 45,288.89
Incremental dollars per GHG saving	$ 1.5	$ 1.51	$ 1.51	$ 1.52	$ 1.52	$ 1.52	$ 1.53	$ 1.53	$ 1.53	$ 1.53
Auxiliary Energy Required Heating [GJ/yr]	253.5	252.2	253.3	253.6	251.8	252.3	253.6	252.2	253.3	250.4
Annual Energy DHW [GJ/yr]	16.5	27.5	27.5	14.9	16.5	16.5	13.9	25.7	25.7	27.5
Annual Energy Space Heating [GJ/yr]	153.5	153.5	154.2	153.5	152.5	153	153.5	153.5	154.2	152.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	198.8	210	210.6	197.3	197.8	198.4	196.3	208.1	208.8	209
Design Heating Load [W]	27970.3	28459.9	28443.9	27970.3	27719.9	27920.1	27970.3	28459.9	28443.9	28209.4
Annual Energy Electricity [kWh/yr]	50653.6	50673.6	50856.5	50655.9	50379.3	50522.1	50657.5	50673.6	50856.5	50415.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,104.17	$ 7,107.	$ 7,132.88	$ 7,104.49	$ 7,065.36	$ 7,085.56	$ 7,104.72	$ 7,107.	$ 7,132.88	$ 7,070.52
Annual Energy Natural Gas [m3/yr]	442.6	739.3	739.3	400.7	442.6	442.6	372.9	690.3	690.3	739.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 318.91	$ 318.91	$ 172.85	$ 190.92	$ 190.92	$ 160.86	$ 297.77	$ 297.77	$ 318.95
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	35671	35668	35866	35672	35887	35689	35673	35669	35867	35884
Upgrade Package List	Pkg3221201033	Pkg3221201033	Pkg3221202032	Pkg3221201033	Pkg3221202033	Pkg3221201034	Pkg3221201033	Pkg3221201033	Pkg3221202032	Pkg3221202033
GHGI [kg/m2]	2.75	3.86	3.86	2.59	2.74	2.75	2.49	3.68	3.68	3.86
% ICC	2.8%	2.7%	2.7%	2.8%	2.8%	2.8%	2.9%	2.8%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	137.8	137.1	137.7	137.8	136.9	137.1	137.8	137.1	137.7	136.1
Output: MEUI [kWh/(m2 * yr)]	94	100.1	100.4	93.2	93.5	93.8	92.6	99.1	99.4	99.6
Output: Better than ERS (%)	67660.0%	72030.0%	72270.0%	67070.0%	67270.0%	67500.0%	66680.0%	71290.0%	71560.0%	71640.0%
Output: Better than Envelope (%)	1010.0%	1050.0%	1010.0%	1000.0%	1070.0%	1050.0%	1000.0%	1050.0%	1010.0%	1120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	41168	41188	41371	41170	40893	41036	41172	41188	41371	40930
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,804.65	$ 5,807.47	$ 5,833.25	$ 5,804.97	$ 5,765.97	$ 5,786.1	$ 5,805.2	$ 5,807.47	$ 5,833.25	$ 5,771.12
Annual savings in carbon tax for electricity [$/year]	$ 20.58	$ 20.59	$ 20.69	$ 20.58	$ 20.45	$ 20.52	$ 20.59	$ 20.59	$ 20.69	$ 20.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,825.23	$ 5,828.06	$ 5,853.94	$ 5,825.55	$ 5,786.42	$ 5,806.62	$ 5,825.78	$ 5,828.06	$ 5,853.94	$ 5,791.58
Annual savings in GHG from electricity savings [kg CO2e/year]	452.8	453.1	455.1	452.9	449.8	451.4	452.9	453.1	455.1	450.2
Annual savings in natural gas [m3/year]	417.55	406.49	406.49	419.11	417.55	417.55	420.14	408.32	408.32	406.49
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,868.56	$ 3,766.14	$ 3,766.14	$ 3,883.03	$ 3,868.56	$ 3,868.56	$ 3,892.62	$ 3,783.05	$ 3,783.05	$ 3,766.11
Annual savings in carbon tax for natural gas [$/year]	$ 965.57	$ 940.01	$ 940.01	$ 969.18	$ 965.57	$ 965.57	$ 971.58	$ 944.23	$ 944.23	$ 940.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,834.14	$ 4,706.15	$ 4,706.15	$ 4,852.21	$ 4,834.14	$ 4,834.14	$ 4,864.2	$ 4,727.29	$ 4,727.29	$ 4,706.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	21457.2	20889.1	20889.1	21537.4	21457.2	21457.2	21590.7	20982.9	20982.9	20888.9
Net Present Value [$]	$ 43,553.69	$ 45,490.36	$ 45,982.56	$ 43,758.43	$ 43,308.95	$ 43,715.	$ 43,829.93	$ 45,630.05	$ 46,122.25	$ 45,288.89
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93	$ 12,164.93
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$ 850.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 550.	$ 550.	$.

LARGE 25SAR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 49,372.12	$ 49,572.12	$ 49,410.62	$ 49,872.12	$ 50,018.66	$ 49,853.37	$ 50,057.16	$ 50,107.16	$ 50,518.66	$ 50,353.37
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 74,156.92	$ 74,457.32	$ 74,214.75	$ 74,907.92	$ 75,128.03	$ 74,879.76	$ 75,185.85	$ 75,260.95	$ 75,879.03	$ 75,630.76
Net Present Value [$]	$ 2,155.53	$ 2,268.36	$ 2,300.51	$ 2,337.36	$ 2,622.73	$ 2,644.5	$ 2,770.14	$ 2,789.32	$ 2,808.09	$ 2,826.33
Incremental dollars per GHG saving	$ 4.77	$ 4.78	$ 4.78	$ 4.78	$ 4.82	$ 4.82	$ 4.83	$ 4.83	$ 4.83	$ 4.84
Auxiliary Energy Required Heating [GJ/yr]	210.2	208.9	210.7	209	207.2	207.9	207.6	208.9	205.9	206.6
Annual Energy DHW [GJ/yr]	13.9	14.9	13.9	13.9	16.5	16.5	16.5	14.9	16.5	16.5
Annual Energy Space Heating [GJ/yr]	222.7	221.3	223.1	221.3	219.4	220.2	219.9	221.3	218.1	218.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	264	263.7	264.4	262.6	263.3	264.1	263.8	263.6	262	262.8
Design Heating Load [W]	23603.6	23553.4	23803.8	23553.4	23340.7	23456.5	23540.9	23591.1	23290.4	23406.2
Annual Energy Electricity [kWh/yr]	8727.9	8721.1	8730.2	8721.1	8711.6	8715.6	8713.9	8720.8	8704.9	8708.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 1,171.68	$ 1,170.72	$ 1,172.01	$ 1,170.72	$ 1,169.38	$ 1,169.94	$ 1,169.7	$ 1,170.68	$ 1,168.43	$ 1,168.98
Annual Energy Natural Gas [m3/yr]	6245.2	6236.9	6257.2	6209.3	6228.8	6249.9	6241.1	6235.3	6193.3	6214
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,693.96	$ 2,690.38	$ 2,699.14	$ 2,678.48	$ 2,686.89	$ 2,695.99	$ 2,692.19	$ 2,689.69	$ 2,671.57	$ 2,680.5
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43764	43781	43566	43782	45706	43978	45508	45491	45724	43996
Upgrade Package List	Pkg3321202053	Pkg3321202054	Pkg3321201054	Pkg3321202054	Pkg3331202053	Pkg3321203053	Pkg3331201054	Pkg3331201053	Pkg3331202054	Pkg3321203054
GHGI [kg/m2]	23.59	23.56	23.63	23.45	23.53	23.61	23.57	23.55	23.39	23.47
% ICC	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.5%	4.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	114.3	113.6	114.5	113.6	112.6	113	112.8	113.5	111.9	112.3
Output: MEUI [kWh/(m2 * yr)]	129.6	129.4	129.8	128.8	129.2	129.6	129.5	129.4	128.5	128.9
Output: Better than ERS (%)	93120.0%	93010.0%	93280.0%	92580.0%	92850.0%	93160.0%	93050.0%	92970.0%	92340.0%	92660.0%
Output: Better than Envelope (%)	2540.0%	2590.0%	2530.0%	2590.0%	2650.0%	2630.0%	2640.0%	2590.0%	2700.0%	2670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	758	765	756	765	774	770	772	765	781	777
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 106.88	$ 107.84	$ 106.55	$ 107.84	$ 109.18	$ 108.61	$ 108.85	$ 107.88	$ 110.12	$ 109.57
Annual savings in carbon tax for electricity [$/year]	$ .38	$ .38	$ .38	$ .38	$ .39	$ .39	$ .39	$ .38	$ .39	$ .39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 107.26	$ 108.22	$ 106.93	$ 108.22	$ 109.56	$ 109.	$ 109.24	$ 108.26	$ 110.51	$ 109.96
Annual savings in GHG from electricity savings [kg CO2e/year]	8.3	8.4	8.3	8.4	8.5	8.5	8.5	8.4	8.6	8.5
Annual savings in natural gas [m3/year]	201.35	201.66	200.9	202.68	201.96	201.17	201.5	201.72	203.28	202.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,865.48	$ 1,868.35	$ 1,861.34	$ 1,877.87	$ 1,871.14	$ 1,863.86	$ 1,866.9	$ 1,868.9	$ 1,883.4	$ 1,876.25
Annual savings in carbon tax for natural gas [$/year]	$ 465.62	$ 466.33	$ 464.58	$ 468.71	$ 467.03	$ 465.21	$ 465.97	$ 466.47	$ 470.09	$ 468.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,331.1	$ 2,334.68	$ 2,325.92	$ 2,346.58	$ 2,338.17	$ 2,329.07	$ 2,332.87	$ 2,335.37	$ 2,353.49	$ 2,344.56
Annual savings in GHG from natural gas savings [kg CO2e/year]	10347	10362.9	10324	10415.7	10378.4	10338	10354.9	10366	10446.4	10406.7
Net Present Value [$]	$ 2,155.53	$ 2,268.36	$ 2,300.51	$ 2,337.36	$ 2,622.73	$ 2,644.5	$ 2,770.14	$ 2,789.32	$ 2,808.09	$ 2,826.33
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	10.47	14.09	8.77	8.77	10.47	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR50	CeilR50	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 639.	$ 639.	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55	$ 21,161.55
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$ 850.	$ 850.	$.	$.	$.	$ 550.	$.	$.

LARGE 25SAR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 37,360.37	$ 37,910.37	$ 38,191.62	$ 38,210.37	$ 38,356.91	$ 38,638.37	$ 38,691.62	$ 38,741.62	$ 38,856.91	$ 38,906.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,115.28	$ 56,941.38	$ 57,363.81	$ 57,391.98	$ 57,612.08	$ 58,034.83	$ 58,114.81	$ 58,189.91	$ 58,363.08	$ 58,438.18
Net Present Value [$]	$ 40,397.22	$ 40,536.9	$ 40,579.93	$ 40,562.95	$ 40,503.24	$ 41,675.22	$ 40,737.45	$ 40,719.61	$ 40,664.96	$ 40,642.68
Incremental dollars per GHG saving	$ 1.82	$ 1.84	$ 1.86	$ 1.85	$ 1.87	$ 1.89	$ 1.89	$ 1.88	$ 1.9	$ 1.89
Auxiliary Energy Required Heating [GJ/yr]	225.5	225.5	224.4	225.5	223.7	225.5	223.2	224.4	222.4	223.7
Annual Energy DHW [GJ/yr]	27.5	25.7	27.5	24.5	27.5	27.5	27.5	25.7	27.5	25.7
Annual Energy Space Heating [GJ/yr]	137.2	137.2	136.4	137.2	135.9	137.2	135.9	136.4	135.5	135.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	193.7	191.9	192.8	190.7	192.5	193.7	192.3	191	192	190.6
Design Heating Load [W]	25355.1	25355.1	25258.3	25355.1	25142.5	25355.1	25208	25258.3	25092.2	25142.5
Annual Energy Electricity [kWh/yr]	46161.7	46161.7	45910.1	46161.7	45817	46161.7	45776.4	45910.1	45685	45817
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,468.57	$ 6,468.57	$ 6,432.96	$ 6,468.57	$ 6,419.79	$ 6,468.57	$ 6,414.05	$ 6,432.96	$ 6,401.11	$ 6,419.79
Annual Energy Natural Gas [m3/yr]	739.4	690.4	739.3	657.7	739	739.4	739.5	690.3	739.2	690
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.95	$ 297.81	$ 318.91	$ 283.71	$ 318.78	$ 318.95	$ 318.99	$ 297.77	$ 318.87	$ 297.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51004	51005	51130	51006	51562	51292	51148	51131	51580	51563
Upgrade Package List	Pkg4321302034	Pkg4321302034	Pkg4321303033	Pkg4321302034	Pkg4331302033	Pkg4321402034	Pkg4321303034	Pkg4321303033	Pkg4331302034	Pkg4331302033
GHGI [kg/m2]	3.76	3.58	3.76	3.46	3.76	3.76	3.76	3.57	3.75	3.57
% ICC	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	122.6	122.6	122	122.6	121.6	122.6	121.3	122	120.9	121.6
Output: MEUI [kWh/(m2 * yr)]	91.2	90.2	90.7	89.6	90.5	91.2	90.5	89.8	90.3	89.6
Output: Better than ERS (%)	65660.0%	64960.0%	65310.0%	64490.0%	65200.0%	65660.0%	65120.0%	64610.0%	65000.0%	64450.0%
Output: Better than Envelope (%)	2000.0%	2000.0%	2040.0%	2000.0%	2060.0%	2000.0%	2080.0%	2040.0%	2110.0%	2060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36676	36676	36424	36676	36331	36676	36290	36424	36199	36331
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,171.29	$ 5,171.29	$ 5,135.81	$ 5,171.29	$ 5,122.69	$ 5,171.29	$ 5,116.96	$ 5,135.81	$ 5,104.07	$ 5,122.69
Annual savings in carbon tax for electricity [$/year]	$ 18.34	$ 18.34	$ 18.21	$ 18.34	$ 18.17	$ 18.34	$ 18.15	$ 18.21	$ 18.1	$ 18.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,189.63	$ 5,189.63	$ 5,154.02	$ 5,189.63	$ 5,140.85	$ 5,189.63	$ 5,135.11	$ 5,154.02	$ 5,122.17	$ 5,140.85
Annual savings in GHG from electricity savings [kg CO2e/year]	403.4	403.4	400.7	403.4	399.6	403.4	399.2	400.7	398.2	399.6
Annual savings in natural gas [m3/year]	406.49	408.31	406.49	409.53	406.5	406.49	406.48	408.32	406.49	408.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,766.11	$ 3,783.02	$ 3,766.14	$ 3,794.31	$ 3,766.24	$ 3,766.11	$ 3,766.07	$ 3,783.05	$ 3,766.17	$ 3,783.16
Annual savings in carbon tax for natural gas [$/year]	$ 940.	$ 944.22	$ 940.01	$ 947.04	$ 940.04	$ 940.	$ 939.99	$ 944.23	$ 940.02	$ 944.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,706.11	$ 4,727.24	$ 4,706.15	$ 4,741.35	$ 4,706.28	$ 4,706.11	$ 4,706.06	$ 4,727.29	$ 4,706.19	$ 4,727.42
Annual savings in GHG from natural gas savings [kg CO2e/year]	20888.9	20982.8	20889.1	21045.4	20889.7	20888.9	20888.7	20982.9	20889.3	20983.5
Net Present Value [$]	$ 40,397.22	$ 40,536.9	$ 40,579.93	$ 40,562.95	$ 40,503.24	$ 41,675.22	$ 40,737.45	$ 40,719.61	$ 40,664.96	$ 40,642.68
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	14.09	10.47	10.47	10.47	14.09	14.09	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 9,549.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$.	$.	$ 550.	$.	$ 550.

LARGE 25SAR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 37,360.37	$ 37,910.37	$ 38,956.91	$ 38,210.37	$ 38,191.62	$ 39,291.62	$ 39,506.91	$ 38,356.91	$ 39,456.91	$ 39,806.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,115.28	$ 56,941.38	$ 58,513.28	$ 57,391.98	$ 57,363.81	$ 59,016.01	$ 59,339.38	$ 57,612.08	$ 59,264.28	$ 59,789.98
Net Present Value [$]	$ 40,397.22	$ 40,536.9	$ 38,625.6	$ 40,562.95	$ 40,579.93	$ 38,868.65	$ 38,830.33	$ 40,503.24	$ 38,786.72	$ 38,901.83
Incremental dollars per GHG saving	$ 1.82	$ 1.84	$ 1.85	$ 1.85	$ 1.86	$ 1.87	$ 1.87	$ 1.87	$ 1.87	$ 1.88
Auxiliary Energy Required Heating [GJ/yr]	225.5	225.5	225.2	225.5	224.4	224.7	225.3	223.7	224	225.3
Annual Energy DHW [GJ/yr]	27.5	25.7	16.5	24.5	27.5	16.5	14.9	27.5	16.5	13.9
Annual Energy Space Heating [GJ/yr]	137.2	137.2	135.9	137.2	136.4	135.9	136	135.9	135.5	136
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	193.7	191.9	181.4	190.7	192.8	181.3	179.9	192.5	181	178.8
Design Heating Load [W]	25355.1	25355.1	24668.9	25355.1	25258.3	24734.5	24668.9	25142.5	24618.7	24668.9
Annual Energy Electricity [kWh/yr]	46161.7	46161.7	45819	46161.7	45910.1	45783.4	45821.3	45817	45687.4	45822.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,468.57	$ 6,468.57	$ 6,420.07	$ 6,468.57	$ 6,432.96	$ 6,415.04	$ 6,420.4	$ 6,419.79	$ 6,401.45	$ 6,420.63
Annual Energy Natural Gas [m3/yr]	739.4	690.4	442.6	657.7	739.3	442.6	400.7	739	442.6	372.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 318.95	$ 297.81	$ 190.92	$ 283.71	$ 318.91	$ 190.92	$ 172.85	$ 318.78	$ 190.92	$ 160.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51004	51005	51565	51006	51130	51151	51566	51562	51583	51567
Upgrade Package List	Pkg4321302034	Pkg4321302034	Pkg4331302033	Pkg4321302034	Pkg4321303033	Pkg4321303034	Pkg4331302033	Pkg4331302033	Pkg4331302034	Pkg4331302033
GHGI [kg/m2]	3.76	3.58	2.64	3.46	3.76	2.64	2.49	3.76	2.64	2.38
% ICC	3.3%	3.4%	3.5%	3.4%	3.4%	3.5%	3.5%	3.4%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	122.6	122.6	122.4	122.6	122	122.2	122.4	121.6	121.7	122.5
Output: MEUI [kWh/(m2 * yr)]	91.2	90.2	84.5	89.6	90.7	84.5	83.7	90.5	84.3	83.1
Output: Better than ERS (%)	65660.0%	64960.0%	60860.0%	64490.0%	65310.0%	60820.0%	60270.0%	65200.0%	60700.0%	59840.0%
Output: Better than Envelope (%)	2000.0%	2000.0%	2010.0%	2000.0%	2040.0%	2030.0%	2010.0%	2060.0%	2050.0%	2010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36676	36676	36333	36676	36424	36298	36335	36331	36202	36337
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,171.29	$ 5,171.29	$ 5,122.97	$ 5,171.29	$ 5,135.81	$ 5,117.95	$ 5,123.29	$ 5,122.69	$ 5,104.41	$ 5,123.52
Annual savings in carbon tax for electricity [$/year]	$ 18.34	$ 18.34	$ 18.17	$ 18.34	$ 18.21	$ 18.15	$ 18.17	$ 18.17	$ 18.1	$ 18.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,189.63	$ 5,189.63	$ 5,141.13	$ 5,189.63	$ 5,154.02	$ 5,136.1	$ 5,141.46	$ 5,140.85	$ 5,122.51	$ 5,141.69
Annual savings in GHG from electricity savings [kg CO2e/year]	403.4	403.4	399.7	403.4	400.7	399.3	399.7	399.6	398.2	399.7
Annual savings in natural gas [m3/year]	406.49	408.31	417.55	409.53	406.49	417.55	419.11	406.5	417.55	420.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,766.11	$ 3,783.02	$ 3,868.56	$ 3,794.31	$ 3,766.14	$ 3,868.56	$ 3,883.03	$ 3,766.24	$ 3,868.56	$ 3,892.62
Annual savings in carbon tax for natural gas [$/year]	$ 940.	$ 944.22	$ 965.57	$ 947.04	$ 940.01	$ 965.57	$ 969.18	$ 940.04	$ 965.57	$ 971.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,706.11	$ 4,727.24	$ 4,834.14	$ 4,741.35	$ 4,706.15	$ 4,834.14	$ 4,852.21	$ 4,706.28	$ 4,834.14	$ 4,864.2
Annual savings in GHG from natural gas savings [kg CO2e/year]	20888.9	20982.8	21457.2	21045.4	20889.1	21457.2	21537.4	20889.7	21457.2	21590.7
Net Present Value [$]	$ 40,397.22	$ 40,536.9	$ 38,625.6	$ 40,562.95	$ 40,579.93	$ 38,868.65	$ 38,830.33	$ 40,503.24	$ 38,786.72	$ 38,901.83
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	14.09	14.09	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$.	$ 550.	$.	$.	$ 850.

LARGE 25SAR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k	large 25sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 38,956.91	$ 39,456.91	$ 39,506.91	$ 39,291.62	$ 39,806.91	$ 40,288.16	$ 40,006.91	$ 40,306.91	$ 39,841.62	$ 40,788.16
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 58,513.28	$ 59,264.28	$ 59,339.38	$ 59,016.01	$ 59,789.98	$ 60,512.82	$ 60,090.38	$ 60,540.98	$ 59,842.11	$ 61,263.82
Net Present Value [$]	$ 38,625.6	$ 38,786.72	$ 38,830.33	$ 38,868.65	$ 38,901.83	$ 38,947.7	$ 38,991.64	$ 39,062.95	$ 39,073.38	$ 39,108.27
Incremental dollars per GHG saving	$ 1.85	$ 1.87	$ 1.87	$ 1.87	$ 1.88	$ 1.91	$ 1.89	$ 1.9	$ 1.89	$ 1.94
Auxiliary Energy Required Heating [GJ/yr]	225.2	224	225.3	224.7	225.3	222.9	224	224	224.7	221.7
Annual Energy DHW [GJ/yr]	16.5	16.5	14.9	16.5	13.9	16.5	14.9	13.9	14.9	16.5
Annual Energy Space Heating [GJ/yr]	135.9	135.5	136	135.9	136	134.6	135.5	135.5	135.9	134.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	181.4	181	179.9	181.3	178.8	180	178.4	178.4	179.8	179.5
Design Heating Load [W]	24668.9	24618.7	24668.9	24734.5	24668.9	24521.8	24618.7	24618.7	24734.5	24471.6
Annual Energy Electricity [kWh/yr]	45819	45687.4	45821.3	45783.4	45822.9	45427	45689.7	45691.3	45785.7	45295.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,420.07	$ 6,401.45	$ 6,420.4	$ 6,415.04	$ 6,420.63	$ 6,364.61	$ 6,401.78	$ 6,402.	$ 6,415.36	$ 6,345.96
Annual Energy Natural Gas [m3/yr]	442.6	442.6	400.7	442.6	372.9	442.6	400.7	372.9	400.7	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 190.92	$ 172.85	$ 160.86	$ 172.85	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51565	51583	51566	51151	51567	51709	51584	51585	51152	51727
Upgrade Package List	Pkg4331302033	Pkg4331302034	Pkg4331302033	Pkg4321303034	Pkg4331302033	Pkg4331303033	Pkg4331302034	Pkg4331302034	Pkg4321303034	Pkg4331303034
GHGI [kg/m2]	2.64	2.64	2.49	2.64	2.38	2.64	2.48	2.38	2.49	2.63
% ICC	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%	3.5%	3.6%	3.5%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	122.4	121.7	122.4	122.2	122.5	121.2	121.8	121.8	122.2	120.5
Output: MEUI [kWh/(m2 * yr)]	84.5	84.3	83.7	84.5	83.1	83.8	83.4	82.9	83.6	83.5
Output: Better than ERS (%)	60860.0%	60700.0%	60270.0%	60820.0%	59840.0%	60310.0%	60080.0%	59690.0%	60230.0%	60120.0%
Output: Better than Envelope (%)	2010.0%	2050.0%	2010.0%	2030.0%	2010.0%	2090.0%	2050.0%	2050.0%	2030.0%	2140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36333	36202	36335	36298	36337	35941	36204	36205	36300	35809
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,122.97	$ 5,104.41	$ 5,123.29	$ 5,117.95	$ 5,123.52	$ 5,067.7	$ 5,104.74	$ 5,104.96	$ 5,118.27	$ 5,049.11
Annual savings in carbon tax for electricity [$/year]	$ 18.17	$ 18.1	$ 18.17	$ 18.15	$ 18.17	$ 17.97	$ 18.1	$ 18.1	$ 18.15	$ 17.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,141.13	$ 5,122.51	$ 5,141.46	$ 5,136.1	$ 5,141.69	$ 5,085.67	$ 5,122.84	$ 5,123.06	$ 5,136.42	$ 5,067.02
Annual savings in GHG from electricity savings [kg CO2e/year]	399.7	398.2	399.7	399.3	399.7	395.4	398.2	398.3	399.3	393.9
Annual savings in natural gas [m3/year]	417.55	417.55	419.11	417.55	420.14	417.55	419.11	420.14	419.11	417.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,868.56	$ 3,868.56	$ 3,883.03	$ 3,868.56	$ 3,892.62	$ 3,868.56	$ 3,883.03	$ 3,892.62	$ 3,883.03	$ 3,868.56
Annual savings in carbon tax for natural gas [$/year]	$ 965.57	$ 965.57	$ 969.18	$ 965.57	$ 971.58	$ 965.57	$ 969.18	$ 971.58	$ 969.18	$ 965.57
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,834.14	$ 4,834.14	$ 4,852.21	$ 4,834.14	$ 4,864.2	$ 4,834.14	$ 4,852.21	$ 4,864.2	$ 4,852.21	$ 4,834.14
Annual savings in GHG from natural gas savings [kg CO2e/year]	21457.2	21457.2	21537.4	21457.2	21590.7	21457.2	21537.4	21590.7	21537.4	21457.2
Net Present Value [$]	$ 38,625.6	$ 38,786.72	$ 38,830.33	$ 38,868.65	$ 38,901.83	$ 38,947.7	$ 38,991.64	$ 39,062.95	$ 39,073.38	$ 39,108.27
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	14.09	10.47	14.09	10.47	10.47	14.09	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8	$ 3,961.8
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25	$ 14,737.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$.

LARGE 50SAR Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 20,781.31	$ 21,331.31	$ 21,584.15	$ 21,631.31	$ 21,775.91	$ 22,045.65	$ 22,084.15	$ 22,134.15	$ 22,237.41	$ 22,284.23
ICC with multiplier (Van=1.0,this Cz =1)	$ 20,781.31	$ 21,331.31	$ 21,584.15	$ 21,631.31	$ 21,775.91	$ 22,045.65	$ 22,084.15	$ 22,134.15	$ 22,237.41	$ 22,284.23
Net Present Value [$]	$ 8,341.31	$ 8,605.72	$ 8,605.4	$ 8,721.31	$ 5,997.09	$ 8,948.59	$ 7,878.07	$ 8,868.84	$ 6,320.8	$ 8,111.92
Incremental dollars per GHG saving	$ 2.09	$ 2.13	$ 2.17	$ 2.15	$ 2.19	$ 2.22	$ 2.22	$ 2.21	$ 2.24	$ 2.24
Auxiliary Energy Required Heating [GJ/yr]	133.5	133.5	133.4	133.5	120.8	132.7	128.5	133.4	120.1	127.5
Annual Energy DHW [GJ/yr]	23.7	22.5	23.7	21.6	23.7	23.7	23.7	22.5	23.8	23.7
Annual Energy Space Heating [GJ/yr]	46.3	46.3	46.3	46.3	41.8	46.1	44.6	46.3	41.6	44.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.1	1.8	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	98.1	96.8	97.4	96	93.4	97.2	95.6	96.1	93.3	95.7
Design Heating Load [W]	18647.1	18647.1	18990.2	18647.1	18762.6	18876.8	18182.2	18990.2	18649.1	18762.6
Annual Energy Electricity [kWh/yr]	20659	20659	20449.1	20659	19360.5	20403.1	19972.6	20449.1	19306.6	19985.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,859.93	$ 2,859.93	$ 2,830.23	$ 2,859.93	$ 2,676.2	$ 2,823.72	$ 2,762.81	$ 2,830.23	$ 2,668.57	$ 2,764.59
Annual Energy Natural Gas [m3/yr]	637.2	603.1	637.4	581.1	637.7	637.4	637.3	603.2	637.8	637.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.87	$ 260.16	$ 274.95	$ 250.67	$ 275.08	$ 274.95	$ 274.91	$ 260.2	$ 275.12	$ 275.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	13276	13277	6490	13278	1738	6760	17722	6491	2008	1684
Upgrade Package List	Pkg2131102013	Pkg2131102013	Pkg1221101011	Pkg2131102013	Pkg1121101031	Pkg1221102011	Pkg2221101011	Pkg1221101011	Pkg1121102031	Pkg1121101021
GHGI [kg/m2]	2.83	2.7	2.83	2.62	2.81	2.83	2.82	2.7	2.81	2.82
% ICC	1.8%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	72.6	72.6	72.5	72.6	65.7	72.2	69.8	72.5	65.3	69.3
Output: MEUI [kWh/(m2 * yr)]	39.3	38.7	38.9	38.2	36.8	38.9	38	38.3	36.7	38
Output: Better than ERS (%)	28320.0%	27810.0%	28050.0%	27500.0%	26480.0%	27970.0%	27340.0%	27540.0%	26450.0%	27380.0%
Output: Better than Envelope (%)	1020.0%	1020.0%	1030.0%	1020.0%	1880.0%	1080.0%	1360.0%	1030.0%	1920.0%	1430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12277	12277	12067	12277	10979	12021	11591	12067	10925	11604
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,731.1	$ 1,731.1	$ 1,701.5	$ 1,731.1	$ 1,548.01	$ 1,695.02	$ 1,634.32	$ 1,701.5	$ 1,540.41	$ 1,636.09
Annual savings in carbon tax for electricity [$/year]	$ 6.14	$ 6.14	$ 6.03	$ 6.14	$ 5.49	$ 6.01	$ 5.8	$ 6.03	$ 5.46	$ 5.8
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,737.24	$ 1,737.24	$ 1,707.54	$ 1,737.24	$ 1,553.5	$ 1,701.03	$ 1,640.11	$ 1,707.54	$ 1,545.87	$ 1,641.9
Annual savings in GHG from electricity savings [kg CO2e/year]	135.1	135.1	132.7	135.1	120.8	132.2	127.5	132.7	120.2	127.6
Annual savings in natural gas [m3/year]	195.93	197.2	195.92	198.02	195.91	195.92	195.93	197.2	195.91	195.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,815.29	$ 1,827.06	$ 1,815.22	$ 1,834.66	$ 1,815.12	$ 1,815.22	$ 1,815.25	$ 1,827.03	$ 1,815.08	$ 1,815.19
Annual savings in carbon tax for natural gas [$/year]	$ 453.09	$ 456.03	$ 453.07	$ 457.92	$ 453.04	$ 453.07	$ 453.08	$ 456.02	$ 453.04	$ 453.06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,268.38	$ 2,283.09	$ 2,268.29	$ 2,292.58	$ 2,268.16	$ 2,268.29	$ 2,268.33	$ 2,283.04	$ 2,268.12	$ 2,268.25
Annual savings in GHG from natural gas savings [kg CO2e/year]	10068.6	10133.9	10068.2	10176	10067.7	10068.2	10068.4	10133.7	10067.5	10068
Net Present Value [$]	$ 8,341.31	$ 8,605.72	$ 8,605.4	$ 8,721.31	$ 5,997.09	$ 8,948.59	$ 7,878.07	$ 8,868.84	$ 6,320.8	$ 8,111.92
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$.	$.	$.	$ 5,252.64	$.	$.	$.	$ 5,252.64	$ 5,760.96
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	3.87	3.87	5.28	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 15,955.83	$ 10,894.95	$ 10,894.95	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 75	HRV sre 75	NA	HRV sre 75	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$.	$ 1,800.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$.	$.	$ 550.	$.	$.

LARGE 50SAR Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 23,149.91	$ 20,781.31	$ 23,611.41	$ 23,649.91	$ 23,699.91	$ 21,331.31	$ 22,375.91	$ 21,631.31	$ 23,999.91	$ 24,111.41
ICC with multiplier (Van=1.0,this Cz =1)	$ 23,149.91	$ 20,781.31	$ 23,611.41	$ 23,649.91	$ 23,699.91	$ 21,331.31	$ 22,375.91	$ 21,631.31	$ 23,999.91	$ 24,111.41
Net Present Value [$]	$ 9,633.84	$ 8,341.31	$ 9,961.51	$ 8,908.7	$ 9,719.16	$ 8,605.72	$ 5,204.83	$ 8,721.31	$ 9,720.82	$ 9,236.54
Incremental dollars per GHG saving	$ 2.08	$ 2.09	$ 2.12	$ 2.12	$ 2.13	$ 2.13	$ 2.14	$ 2.15	$ 2.16	$ 2.16
Auxiliary Energy Required Heating [GJ/yr]	128.1	133.5	127.5	123.4	127.8	133.5	124	133.5	127.6	122.8
Annual Energy DHW [GJ/yr]	7.8	23.7	7.8	7.8	7.2	22.5	13.5	21.6	6.9	7.8
Annual Energy Space Heating [GJ/yr]	44.6	46.3	44.4	42.9	44.5	46.3	43.1	46.3	44.5	42.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.8	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	80.3	98.1	80.1	78.6	79.7	96.8	84.5	96	79.3	78.4
Design Heating Load [W]	18762.6	18647.1	18649.1	17954.6	18762.6	18647.1	18640.1	18647.1	18762.6	17841.1
Annual Energy Electricity [kWh/yr]	22314.2	20659	22262.2	21838.3	22133.7	20659	19716.3	20659	22017.8	21786.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,094.14	$ 2,859.93	$ 3,086.79	$ 3,026.8	$ 3,068.6	$ 2,859.93	$ 2,726.54	$ 2,859.93	$ 3,052.2	$ 3,019.46
Annual Energy Natural Gas [m3/yr]	0	637.2	0	0	0	603.1	362.1	581.1	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 274.87	$.	$.	$.	$ 260.16	$ 156.2	$ 250.67	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1744	13276	2014	11464	1745	13277	1741	13278	1746	11734
Upgrade Package List	Pkg1121101031	Pkg2131102013	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg2131102013	Pkg1121101031	Pkg2131102013	Pkg1121101031	Pkg2121102031
GHGI [kg/m2]	0.48	2.83	0.48	0.47	0.48	2.7	1.78	2.62	0.47	0.47
% ICC	2.1%	1.8%	2.1%	2.1%	2.1%	1.9%	2.0%	1.9%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	69.6	72.6	69.3	67.1	69.5	72.6	67.4	72.6	69.4	66.7
Output: MEUI [kWh/(m2 * yr)]	29.6	39.3	29.5	28.7	29.3	38.7	31.9	38.2	29.1	28.6
Output: Better than ERS (%)	21370.0%	28320.0%	21290.0%	20700.0%	21130.0%	27810.0%	23010.0%	27500.0%	20980.0%	20620.0%
Output: Better than Envelope (%)	1390.0%	1020.0%	1430.0%	1700.0%	1410.0%	1020.0%	1660.0%	1020.0%	1420.0%	1740.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13932	12277	13880	13457	13752	12277	11335	12277	13636	13405
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,964.48	$ 1,731.1	$ 1,957.15	$ 1,897.38	$ 1,939.03	$ 1,731.1	$ 1,598.18	$ 1,731.1	$ 1,922.69	$ 1,890.06
Annual savings in carbon tax for electricity [$/year]	$ 6.97	$ 6.14	$ 6.94	$ 6.73	$ 6.88	$ 6.14	$ 5.67	$ 6.14	$ 6.82	$ 6.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,971.45	$ 1,737.24	$ 1,964.09	$ 1,904.11	$ 1,945.91	$ 1,737.24	$ 1,603.85	$ 1,737.24	$ 1,929.51	$ 1,896.77
Annual savings in GHG from electricity savings [kg CO2e/year]	153.3	135.1	152.7	148	151.3	135.1	124.7	135.1	150	147.5
Annual savings in natural gas [m3/year]	219.67	195.93	219.67	219.67	219.67	197.2	206.18	198.02	219.67	219.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,035.25	$ 1,815.29	$ 2,035.25	$ 2,035.25	$ 2,035.25	$ 1,827.06	$ 1,910.25	$ 1,834.66	$ 2,035.25	$ 2,035.25
Annual savings in carbon tax for natural gas [$/year]	$ 507.99	$ 453.09	$ 507.99	$ 507.99	$ 507.99	$ 456.03	$ 476.79	$ 457.92	$ 507.99	$ 507.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,543.24	$ 2,268.38	$ 2,543.24	$ 2,543.24	$ 2,543.24	$ 2,283.09	$ 2,387.05	$ 2,292.58	$ 2,543.24	$ 2,543.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	11288.7	10068.6	11288.7	11288.7	11288.7	10133.9	10595.3	10176	11288.7	11288.7
Net Present Value [$]	$ 9,633.84	$ 8,341.31	$ 9,961.51	$ 8,908.7	$ 9,719.16	$ 8,605.72	$ 5,204.83	$ 8,721.31	$ 9,720.82	$ 9,236.54
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	10.47	8.77	8.77	10.47	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$.	$ 5,252.64	$ 5,252.64	$ 5,252.64	$.	$ 5,252.64	$.	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	HRV sre 75	NA	NA	NA	HRV sre 75	NA	HRV sre 75	NA	NA
DHW System Code	elec heatpump ef1.90	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$ 1,800.	$.	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$ 600.	$.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.

LARGE 50SAR Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 22,875.91	$ 23,425.91	$ 23,725.91	$ 22,375.91	$ 22,925.91	$ 23,225.91	$ 22,837.41	$ 23,387.41	$ 21,775.91	$ 23,687.41
ICC with multiplier (Van=1.0,this Cz =1)	$ 22,875.91	$ 23,425.91	$ 23,725.91	$ 22,375.91	$ 22,925.91	$ 23,225.91	$ 22,837.41	$ 23,387.41	$ 21,775.91	$ 23,687.41
Net Present Value [$]	$ 4,294.54	$ 4,603.24	$ 4,747.95	$ 5,204.83	$ 5,513.52	$ 5,658.6	$ 5,668.88	$ 5,977.58	$ 5,997.09	$ 6,122.66
Incremental dollars per GHG saving	$ 2.18	$ 2.22	$ 2.25	$ 2.14	$ 2.18	$ 2.2	$ 2.18	$ 2.22	$ 2.19	$ 2.24
Auxiliary Energy Required Heating [GJ/yr]	119.3	119.3	119.4	124	124	124	123.4	123.4	120.8	123.4
Annual Energy DHW [GJ/yr]	13.5	12.4	11.7	13.5	12.4	11.7	13.5	12.4	23.7	11.7
Annual Energy Space Heating [GJ/yr]	41.1	41.1	41.1	43.1	43.1	43.1	43.1	43.1	41.8	43.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	82.5	81.4	80.7	84.5	83.4	82.7	84.5	83.4	93.4	82.7
Design Heating Load [W]	17832.3	17832.3	17832.3	18640.1	18640.1	18640.1	18526.6	18526.6	18762.6	18526.6
Annual Energy Electricity [kWh/yr]	19168.5	19169.5	19170.1	19716.3	19717.3	19718	19717.3	19718.3	19360.5	19719
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,649.03	$ 2,649.17	$ 2,649.25	$ 2,726.54	$ 2,726.68	$ 2,726.78	$ 2,726.68	$ 2,726.82	$ 2,676.2	$ 2,726.92
Annual Energy Natural Gas [m3/yr]	362.1	333	314.3	362.1	333	314.3	362.1	333	637.7	314.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 135.58	$ 156.2	$ 143.64	$ 135.58	$ 156.2	$ 143.64	$ 275.08	$ 135.58
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11462	11463	1741	1742	1743	2011	2012	1738	2013
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg1121101031	Pkg1121102031	Pkg1121102031	Pkg1121101031	Pkg1121102031
GHGI [kg/m2]	1.77	1.66	1.59	1.78	1.67	1.6	1.78	1.67	2.81	1.6
% ICC	2.0%	2.1%	2.1%	2.0%	2.0%	2.1%	2.0%	2.1%	1.9%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	64.9	64.9	64.9	67.4	67.4	67.4	67.1	67.1	65.7	67.1
Output: MEUI [kWh/(m2 * yr)]	30.8	30.2	29.8	31.9	31.3	30.9	31.9	31.3	36.8	30.9
Output: Better than ERS (%)	22230.0%	21800.0%	21520.0%	23010.0%	22580.0%	22300.0%	23010.0%	22580.0%	26480.0%	22300.0%
Output: Better than Envelope (%)	1980.0%	1980.0%	1970.0%	1660.0%	1660.0%	1660.0%	1700.0%	1700.0%	1880.0%	1700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10787	10788	10788	11335	11336	11336	11336	11337	10979	11337
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,520.94	$ 1,521.08	$ 1,521.16	$ 1,598.18	$ 1,598.32	$ 1,598.42	$ 1,598.32	$ 1,598.46	$ 1,548.01	$ 1,598.56
Annual savings in carbon tax for electricity [$/year]	$ 5.39	$ 5.39	$ 5.39	$ 5.67	$ 5.67	$ 5.67	$ 5.67	$ 5.67	$ 5.49	$ 5.67
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,526.33	$ 1,526.47	$ 1,526.56	$ 1,603.85	$ 1,603.99	$ 1,604.09	$ 1,603.99	$ 1,604.13	$ 1,553.5	$ 1,604.23
Annual savings in GHG from electricity savings [kg CO2e/year]	118.7	118.7	118.7	124.7	124.7	124.7	124.7	124.7	120.8	124.7
Annual savings in natural gas [m3/year]	206.18	207.26	207.96	206.18	207.26	207.96	206.18	207.26	195.91	207.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,910.25	$ 1,920.3	$ 1,926.76	$ 1,910.25	$ 1,920.3	$ 1,926.76	$ 1,910.25	$ 1,920.3	$ 1,815.12	$ 1,926.76
Annual savings in carbon tax for natural gas [$/year]	$ 476.79	$ 479.3	$ 480.91	$ 476.79	$ 479.3	$ 480.91	$ 476.79	$ 479.3	$ 453.04	$ 480.91
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,387.05	$ 2,399.6	$ 2,407.66	$ 2,387.05	$ 2,399.6	$ 2,407.66	$ 2,387.05	$ 2,399.6	$ 2,268.16	$ 2,407.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	10595.3	10651.1	10686.9	10595.3	10651.1	10686.9	10595.3	10651.1	10067.7	10686.9
Net Present Value [$]	$ 4,294.54	$ 4,603.24	$ 4,747.95	$ 5,204.83	$ 5,513.52	$ 5,658.6	$ 5,668.88	$ 5,977.58	$ 5,997.09	$ 6,122.66
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	8.77	8.77	10.47	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.

LARGE 50SAR Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,275.91	$ 22,737.41	$ 22,825.91	$ 23,125.91	$ 23,287.41	$ 23,337.41	$ 23,587.41	$ 23,635.91	$ 23,772.45	$ 23,887.41
ICC with multiplier (Van=1.0,this Cz =1)	$ 22,275.91	$ 22,737.41	$ 22,825.91	$ 23,125.91	$ 23,287.41	$ 23,337.41	$ 23,587.41	$ 23,635.91	$ 23,772.45	$ 23,887.41
Net Present Value [$]	$ 5,292.21	$ 5,616.04	$ 5,555.89	$ 5,672.45	$ 5,880.45	$ 4,947.39	$ 5,997.01	$ 6,458.12	$ 6,343.01	$ 5,256.27
Incremental dollars per GHG saving	$ 2.24	$ 2.29	$ 2.28	$ 2.3	$ 2.33	$ 2.23	$ 2.35	$ 2.38	$ 2.39	$ 2.27
Auxiliary Energy Required Heating [GJ/yr]	116.1	115.4	116.1	116.1	115.4	118.7	115.4	113.2	114.3	118.7
Annual Energy DHW [GJ/yr]	23.7	23.7	22.5	21.7	22.5	13.5	21.7	23.7	23.7	12.4
Annual Energy Space Heating [GJ/yr]	40.1	39.9	40.1	40.1	39.9	41.4	39.9	39.2	39.5	41.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	91.8	91.6	90.5	89.7	90.3	82.8	89.5	91.5	91.1	81.7
Design Heating Load [W]	17954.6	17841.1	17954.6	17954.6	17841.1	17718.8	17841.1	17537.1	17768.3	17718.8
Annual Energy Electricity [kWh/yr]	18892.5	18839	18892.5	18892.5	18839	19242.8	18839	18817.1	18720	19243.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,609.97	$ 2,602.4	$ 2,609.97	$ 2,609.97	$ 2,602.4	$ 2,659.54	$ 2,602.4	$ 2,599.3	$ 2,585.56	$ 2,659.7
Annual Energy Natural Gas [m3/yr]	637.7	637.7	603.5	581.6	603.6	362.1	581.7	637.7	637.5	333
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.08	$ 275.08	$ 260.33	$ 250.88	$ 260.37	$ 156.2	$ 250.93	$ 275.08	$ 275.	$ 143.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11458	11728	11459	11460	11729	11731	11730	11476	13078	11732
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121102031	Pkg2121101032	Pkg2131101031	Pkg2121102031
GHGI [kg/m2]	2.8	2.79	2.67	2.59	2.67	1.77	2.59	2.79	2.79	1.66
% ICC	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	63.1	62.7	63.1	63.1	62.7	64.5	62.7	61.6	62.1	64.5
Output: MEUI [kWh/(m2 * yr)]	35.8	35.7	35.2	34.7	35.1	31	34.6	35.7	35.5	30.4
Output: Better than ERS (%)	25860.0%	25780.0%	25350.0%	25040.0%	25270.0%	22340.0%	24960.0%	25740.0%	25590.0%	21910.0%
Output: Better than Envelope (%)	2190.0%	2240.0%	2190.0%	2190.0%	2240.0%	2020.0%	2240.0%	2390.0%	2310.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10511	10457	10511	10511	10457	10861	10457	10435	10338	10862
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,482.02	$ 1,474.48	$ 1,482.02	$ 1,482.02	$ 1,474.48	$ 1,531.42	$ 1,474.48	$ 1,471.39	$ 1,457.7	$ 1,531.57
Annual savings in carbon tax for electricity [$/year]	$ 5.26	$ 5.23	$ 5.26	$ 5.26	$ 5.23	$ 5.43	$ 5.23	$ 5.22	$ 5.17	$ 5.43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,487.28	$ 1,479.71	$ 1,487.28	$ 1,487.28	$ 1,479.71	$ 1,536.85	$ 1,479.71	$ 1,476.61	$ 1,462.87	$ 1,537.
Annual savings in GHG from electricity savings [kg CO2e/year]	115.6	115	115.6	115.6	115	119.5	115	114.8	113.7	119.5
Annual savings in natural gas [m3/year]	195.91	195.91	197.19	198	197.18	206.18	198	195.91	195.92	207.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,815.12	$ 1,815.12	$ 1,826.92	$ 1,834.48	$ 1,826.89	$ 1,910.25	$ 1,834.45	$ 1,815.12	$ 1,815.19	$ 1,920.3
Annual savings in carbon tax for natural gas [$/year]	$ 453.04	$ 453.04	$ 455.99	$ 457.88	$ 455.98	$ 476.79	$ 457.87	$ 453.04	$ 453.06	$ 479.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,268.16	$ 2,268.16	$ 2,282.91	$ 2,292.36	$ 2,282.87	$ 2,387.05	$ 2,292.32	$ 2,268.16	$ 2,268.25	$ 2,399.6
Annual savings in GHG from natural gas savings [kg CO2e/year]	10067.7	10067.7	10133.1	10175.1	10132.9	10595.3	10174.9	10067.7	10068	10651.1
Net Present Value [$]	$ 5,292.21	$ 5,616.04	$ 5,555.89	$ 5,672.45	$ 5,880.45	$ 4,947.39	$ 5,997.01	$ 6,458.12	$ 6,343.01	$ 5,256.27
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	10.47	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.	$.	$.	$ 550.

LARGE 50SAR Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 23,337.41	$ 22,275.91	$ 23,887.41	$ 22,825.91	$ 22,737.41	$ 24,187.41	$ 23,125.91	$ 24,235.91	$ 23,287.41	$ 25,911.41
ICC with multiplier (Van=1.0,this Cz =1)	$ 23,337.41	$ 22,275.91	$ 23,887.41	$ 22,825.91	$ 22,737.41	$ 24,187.41	$ 23,125.91	$ 24,235.91	$ 23,287.41	$ 25,911.41
Net Present Value [$]	$ 4,947.39	$ 5,292.21	$ 5,256.27	$ 5,555.89	$ 5,616.04	$ 5,400.98	$ 5,672.45	$ 5,651.44	$ 5,880.45	$ 10,548.68
Incremental dollars per GHG saving	$ 2.23	$ 2.24	$ 2.27	$ 2.28	$ 2.29	$ 2.29	$ 2.3	$ 2.31	$ 2.33	$ 2.33
Auxiliary Energy Required Heating [GJ/yr]	118.7	116.1	118.7	116.1	115.4	118.7	116.1	116.5	115.4	118.7
Annual Energy DHW [GJ/yr]	13.5	23.7	12.4	22.5	23.7	11.7	21.7	13.5	22.5	7.8
Annual Energy Space Heating [GJ/yr]	41.4	40.1	41.4	40.1	39.9	41.4	40.1	40.4	39.9	41.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.8
Total Energy [GJ/yr]	82.8	91.8	81.7	90.5	91.6	81	89.7	82.5	90.3	77.7
Design Heating Load [W]	17718.8	17954.6	17718.8	17954.6	17841.1	17718.8	17954.6	17414.8	17841.1	17317.4
Annual Energy Electricity [kWh/yr]	19242.8	18892.5	19243.9	18892.5	18839	19244.5	18892.5	19167.3	18839	21596.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,659.54	$ 2,609.97	$ 2,659.7	$ 2,609.97	$ 2,602.4	$ 2,659.78	$ 2,609.97	$ 2,648.86	$ 2,602.4	$ 2,992.65
Annual Energy Natural Gas [m3/yr]	362.1	637.7	333	603.5	637.7	314.3	581.6	362.1	603.6	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 275.08	$ 143.64	$ 260.33	$ 275.08	$ 135.58	$ 250.88	$ 156.2	$ 260.37	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11731	11458	11732	11459	11728	11733	11460	11479	11729	11770
Upgrade Package List	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2121101032	Pkg2121102031	Pkg2121102033
GHGI [kg/m2]	1.77	2.8	1.66	2.67	2.79	1.59	2.59	1.77	2.67	0.46
% ICC	2.1%	2.0%	2.1%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.5	63.1	64.5	63.1	62.7	64.5	63.1	63.3	62.7	64.5
Output: MEUI [kWh/(m2 * yr)]	31	35.8	30.4	35.2	35.7	30	34.7	30.8	35.1	28.2
Output: Better than ERS (%)	22340.0%	25860.0%	21910.0%	25350.0%	25780.0%	21640.0%	25040.0%	22230.0%	25270.0%	20350.0%
Output: Better than Envelope (%)	2020.0%	2190.0%	2020.0%	2190.0%	2240.0%	2020.0%	2190.0%	2170.0%	2240.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10861	10511	10862	10511	10457	10863	10511	10786	10457	13215
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,531.42	$ 1,482.02	$ 1,531.57	$ 1,482.02	$ 1,474.48	$ 1,531.65	$ 1,482.02	$ 1,520.77	$ 1,474.48	$ 1,863.34
Annual savings in carbon tax for electricity [$/year]	$ 5.43	$ 5.26	$ 5.43	$ 5.26	$ 5.23	$ 5.43	$ 5.26	$ 5.39	$ 5.23	$ 6.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,536.85	$ 1,487.28	$ 1,537.	$ 1,487.28	$ 1,479.71	$ 1,537.09	$ 1,487.28	$ 1,526.16	$ 1,479.71	$ 1,869.95
Annual savings in GHG from electricity savings [kg CO2e/year]	119.5	115.6	119.5	115.6	115	119.5	115.6	118.6	115	145.4
Annual savings in natural gas [m3/year]	206.18	195.91	207.26	197.19	195.91	207.96	198	206.18	197.18	219.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,910.25	$ 1,815.12	$ 1,920.3	$ 1,826.92	$ 1,815.12	$ 1,926.76	$ 1,834.48	$ 1,910.25	$ 1,826.89	$ 2,035.25
Annual savings in carbon tax for natural gas [$/year]	$ 476.79	$ 453.04	$ 479.3	$ 455.99	$ 453.04	$ 480.91	$ 457.88	$ 476.79	$ 455.98	$ 507.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,387.05	$ 2,268.16	$ 2,399.6	$ 2,282.91	$ 2,268.16	$ 2,407.66	$ 2,292.36	$ 2,387.05	$ 2,282.87	$ 2,543.24
Annual savings in GHG from natural gas savings [kg CO2e/year]	10595.3	10067.7	10651.1	10133.1	10067.7	10686.9	10175.1	10595.3	10132.9	11288.7
Net Present Value [$]	$ 4,947.39	$ 5,292.21	$ 5,256.27	$ 5,555.89	$ 5,616.04	$ 5,400.98	$ 5,672.45	$ 5,651.44	$ 5,880.45	$ 10,548.68
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	8.77	10.47	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.	$ 550.	$.

LARGE 50SAR Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 23,337.41	$ 23,887.41	$ 22,275.91	$ 24,187.41	$ 24,372.45	$ 22,825.91	$ 22,737.41	$ 24,675.91	$ 24,235.91	$ 23,125.91
ICC with multiplier (Van=1.0,this Cz =1)	$ 23,337.41	$ 23,887.41	$ 22,275.91	$ 24,187.41	$ 24,372.45	$ 22,825.91	$ 22,737.41	$ 24,675.91	$ 24,235.91	$ 23,125.91
Net Present Value [$]	$ 4,947.39	$ 5,256.27	$ 5,292.21	$ 5,400.98	$ 5,536.19	$ 5,555.89	$ 5,616.04	$ 5,624.75	$ 5,651.44	$ 5,672.45
Incremental dollars per GHG saving	$ 2.23	$ 2.27	$ 2.24	$ 2.29	$ 2.33	$ 2.28	$ 2.29	$ 2.36	$ 2.31	$ 2.3
Auxiliary Energy Required Heating [GJ/yr]	118.7	118.7	116.1	118.7	117.5	116.1	115.4	115.3	116.5	116.1
Annual Energy DHW [GJ/yr]	13.5	12.4	23.7	11.7	13.5	22.5	23.7	13.5	13.5	21.7
Annual Energy Space Heating [GJ/yr]	41.4	41.4	40.1	41.4	40.8	40.1	39.9	39.8	40.4	40.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.8	1.1
Total Energy [GJ/yr]	82.8	81.7	91.8	81	82.1	90.5	91.6	81.8	82.5	89.7
Design Heating Load [W]	17718.8	17718.8	17954.6	17718.8	17646	17954.6	17841.1	17308.6	17414.8	17954.6
Annual Energy Electricity [kWh/yr]	19242.8	19243.9	18892.5	19244.5	19069.5	18892.5	18839	18986	19167.3	18892.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,659.54	$ 2,659.7	$ 2,609.97	$ 2,659.78	$ 2,635.02	$ 2,609.97	$ 2,602.4	$ 2,623.2	$ 2,648.86	$ 2,609.97
Annual Energy Natural Gas [m3/yr]	362.1	333	637.7	314.3	362.1	603.5	637.7	362.1	362.1	581.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.64	$ 275.08	$ 135.58	$ 156.2	$ 260.33	$ 275.08	$ 156.2	$ 156.2	$ 250.88
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	11731	11732	11458	11733	13081	11459	11728	11497	11479	11460
Upgrade Package List	Pkg2121102031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121102031	Pkg2121101033	Pkg2121101032	Pkg2121101031
GHGI [kg/m2]	1.77	1.66	2.8	1.59	1.77	2.67	2.79	1.77	1.77	2.59
% ICC	2.1%	2.1%	2.0%	2.1%	2.2%	2.0%	2.0%	2.2%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.5	64.5	63.1	64.5	63.9	63.1	62.7	62.7	63.3	63.1
Output: MEUI [kWh/(m2 * yr)]	31	30.4	35.8	30	30.6	35.2	35.7	30.5	30.8	34.7
Output: Better than ERS (%)	22340.0%	21910.0%	25860.0%	21640.0%	22070.0%	25350.0%	25780.0%	21950.0%	22230.0%	25040.0%
Output: Better than Envelope (%)	2020.0%	2020.0%	2190.0%	2020.0%	2100.0%	2190.0%	2240.0%	2250.0%	2170.0%	2190.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10861	10862	10511	10863	10688	10511	10457	10604	10786	10511
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,531.42	$ 1,531.57	$ 1,482.02	$ 1,531.65	$ 1,506.98	$ 1,482.02	$ 1,474.48	$ 1,495.21	$ 1,520.77	$ 1,482.02
Annual savings in carbon tax for electricity [$/year]	$ 5.43	$ 5.43	$ 5.26	$ 5.43	$ 5.34	$ 5.26	$ 5.23	$ 5.3	$ 5.39	$ 5.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,536.85	$ 1,537.	$ 1,487.28	$ 1,537.09	$ 1,512.32	$ 1,487.28	$ 1,479.71	$ 1,500.51	$ 1,526.16	$ 1,487.28
Annual savings in GHG from electricity savings [kg CO2e/year]	119.5	119.5	115.6	119.5	117.6	115.6	115	116.6	118.6	115.6
Annual savings in natural gas [m3/year]	206.18	207.26	195.91	207.96	206.18	197.19	195.91	206.18	206.18	198
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,910.25	$ 1,920.3	$ 1,815.12	$ 1,926.76	$ 1,910.25	$ 1,826.92	$ 1,815.12	$ 1,910.25	$ 1,910.25	$ 1,834.48
Annual savings in carbon tax for natural gas [$/year]	$ 476.79	$ 479.3	$ 453.04	$ 480.91	$ 476.79	$ 455.99	$ 453.04	$ 476.79	$ 476.79	$ 457.88
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,387.05	$ 2,399.6	$ 2,268.16	$ 2,407.66	$ 2,387.05	$ 2,282.91	$ 2,268.16	$ 2,387.05	$ 2,387.05	$ 2,292.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	10595.3	10651.1	10067.7	10686.9	10595.3	10133.1	10067.7	10595.3	10595.3	10175.1
Net Present Value [$]	$ 4,947.39	$ 5,256.27	$ 5,292.21	$ 5,400.98	$ 5,536.19	$ 5,555.89	$ 5,616.04	$ 5,624.75	$ 5,651.44	$ 5,672.45
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	8.77	10.47	8.77	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.	$.	$.	$ 850.

LARGE 50SAR Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 64,556.05	$ 65,106.05	$ 65,387.3	$ 65,406.05	$ 65,887.3	$ 65,937.3	$ 66,237.3	$ 66,437.3	$ 66,544.05	$ 66,737.3
ICC with multiplier (Van=1.0,this Cz =1)	$ 64,556.05	$ 65,106.05	$ 65,387.3	$ 65,406.05	$ 65,887.3	$ 65,937.3	$ 66,237.3	$ 66,437.3	$ 66,544.05	$ 66,737.3
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,756.6	$ 38,249.89	$ 39,061.1	$ 39,021.	$ 39,137.56	$ 39,324.54	$ 39,857.66	$ 39,441.1
Incremental dollars per GHG saving	$ 6.46	$ 6.47	$ 6.54	$ 6.48	$ 6.59	$ 6.56	$ 6.56	$ 6.61	$ 6.66	$ 6.61
Auxiliary Energy Required Heating [GJ/yr]	74.4	74.4	74.3	74.4	73.5	74.3	74.3	73.5	74.4	73.5
Annual Energy DHW [GJ/yr]	23.8	22.5	23.8	21.7	23.8	22.5	21.7	22.5	23.8	21.7
Annual Energy Space Heating [GJ/yr]	25.7	25.7	25.8	25.7	25.5	25.8	25.8	25.5	25.7	25.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	78.2	76.9	78.3	76.1	78	77	76.2	76.7	78.2	75.9
Design Heating Load [W]	13011.4	13011.4	12967.5	13011.4	12944.7	12967.5	12967.5	12944.7	13011.4	12944.7
Annual Energy Electricity [kWh/yr]	15123	15123	15144.6	15123	15068.3	15144.6	15144.6	15068.3	15123	15068.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,076.59	$ 2,076.59	$ 2,079.65	$ 2,076.59	$ 2,068.85	$ 2,079.65	$ 2,079.65	$ 2,068.85	$ 2,076.59	$ 2,068.85
Annual Energy Natural Gas [m3/yr]	637.9	603.7	637.9	581.8	638	603.8	581.9	603.8	637.9	581.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.17	$ 260.42	$ 275.17	$ 250.97	$ 275.21	$ 260.46	$ 251.01	$ 260.46	$ 275.17	$ 251.01
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45730	45731	45928	45732	45946	45929	45930	45947	46378	45948
Upgrade Package List	Pkg3331202054	Pkg3331202054	Pkg3331203053	Pkg3331202054	Pkg3331203054	Pkg3331203053	Pkg3331203053	Pkg3331203054	Pkg3331302054	Pkg3331203054
GHGI [kg/m2]	2.72	2.59	2.72	2.51	2.71	2.59	2.51	2.59	2.72	2.5
% ICC	5.7%	5.8%	5.8%	5.8%	5.8%	5.8%	5.9%	5.9%	5.9%	5.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	40.4	40.4	40.4	40.4	40	40.4	40.4	40	40.4	40
Output: MEUI [kWh/(m2 * yr)]	28.5	27.8	28.5	27.3	28.4	27.8	27.4	27.7	28.5	27.2
Output: Better than ERS (%)	20550.0%	20040.0%	20590.0%	19730.0%	20470.0%	20080.0%	19770.0%	19960.0%	20550.0%	19650.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5060.0%	5000.0%	5000.0%	5060.0%	5000.0%	5060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6741	6741	6763	6741	6687	6763	6763	6687	6741	6687
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 950.52	$ 950.52	$ 953.57	$ 950.52	$ 942.81	$ 953.57	$ 953.57	$ 942.81	$ 950.52	$ 942.81
Annual savings in carbon tax for electricity [$/year]	$ 3.37	$ 3.37	$ 3.38	$ 3.37	$ 3.34	$ 3.38	$ 3.38	$ 3.34	$ 3.37	$ 3.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 953.89	$ 953.89	$ 956.95	$ 953.89	$ 946.15	$ 956.95	$ 956.95	$ 946.15	$ 953.89	$ 946.15
Annual savings in GHG from electricity savings [kg CO2e/year]	74.2	74.2	74.4	74.2	73.6	74.4	74.4	73.6	74.2	73.6
Annual savings in natural gas [m3/year]	195.9	197.18	195.9	197.99	195.9	197.17	197.99	197.17	195.9	197.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,815.05	$ 1,826.85	$ 1,815.05	$ 1,834.41	$ 1,815.01	$ 1,826.82	$ 1,834.38	$ 1,826.82	$ 1,815.05	$ 1,834.38
Annual savings in carbon tax for natural gas [$/year]	$ 453.03	$ 455.97	$ 453.03	$ 457.86	$ 453.02	$ 455.97	$ 457.85	$ 455.97	$ 453.03	$ 457.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,268.07	$ 2,282.83	$ 2,268.07	$ 2,292.27	$ 2,268.03	$ 2,282.78	$ 2,292.23	$ 2,282.78	$ 2,268.07	$ 2,292.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	10067.3	10132.8	10067.3	10174.7	10067.1	10132.6	10174.5	10132.6	10067.3	10174.5
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,756.6	$ 38,249.89	$ 39,061.1	$ 39,021.	$ 39,137.56	$ 39,324.54	$ 39,857.66	$ 39,441.1
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	14.09	10.47	14.09	14.09	14.09	14.09	10.47	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR80	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 850.	$ 550.	$.	$ 850.

LARGE 50SAR Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 64,556.05	$ 65,106.05	$ 65,406.05	$ 65,387.3	$ 65,937.3	$ 66,237.3	$ 65,887.3	$ 66,437.3	$ 66,737.3	$ 66,544.05
ICC with multiplier (Van=1.0,this Cz =1)	$ 64,556.05	$ 65,106.05	$ 65,406.05	$ 65,387.3	$ 65,937.3	$ 66,237.3	$ 65,887.3	$ 66,437.3	$ 66,737.3	$ 66,544.05
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,249.89	$ 38,756.6	$ 39,021.	$ 39,137.56	$ 39,061.1	$ 39,324.54	$ 39,441.1	$ 39,857.66
Incremental dollars per GHG saving	$ 6.46	$ 6.47	$ 6.48	$ 6.54	$ 6.56	$ 6.56	$ 6.59	$ 6.61	$ 6.61	$ 6.66
Auxiliary Energy Required Heating [GJ/yr]	74.4	74.4	74.4	74.3	74.3	74.3	73.5	73.5	73.5	74.4
Annual Energy DHW [GJ/yr]	23.8	22.5	21.7	23.8	22.5	21.7	23.8	22.5	21.7	23.8
Annual Energy Space Heating [GJ/yr]	25.7	25.7	25.7	25.8	25.8	25.8	25.5	25.5	25.5	25.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	78.2	76.9	76.1	78.3	77	76.2	78	76.7	75.9	78.2
Design Heating Load [W]	13011.4	13011.4	13011.4	12967.5	12967.5	12967.5	12944.7	12944.7	12944.7	13011.4
Annual Energy Electricity [kWh/yr]	15123	15123	15123	15144.6	15144.6	15144.6	15068.3	15068.3	15068.3	15123
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,076.59	$ 2,076.59	$ 2,076.59	$ 2,079.65	$ 2,079.65	$ 2,079.65	$ 2,068.85	$ 2,068.85	$ 2,068.85	$ 2,076.59
Annual Energy Natural Gas [m3/yr]	637.9	603.7	581.8	637.9	603.8	581.9	638	603.8	581.9	637.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.17	$ 260.42	$ 250.97	$ 275.17	$ 260.46	$ 251.01	$ 275.21	$ 260.46	$ 251.01	$ 275.17
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45730	45731	45732	45928	45929	45930	45946	45947	45948	46378
Upgrade Package List	Pkg3331202054	Pkg3331202054	Pkg3331202054	Pkg3331203053	Pkg3331203053	Pkg3331203053	Pkg3331203054	Pkg3331203054	Pkg3331203054	Pkg3331302054
GHGI [kg/m2]	2.72	2.59	2.51	2.72	2.59	2.51	2.71	2.59	2.5	2.72
% ICC	5.7%	5.8%	5.8%	5.8%	5.8%	5.9%	5.8%	5.9%	5.9%	5.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	40.4	40.4	40.4	40.4	40.4	40.4	40	40	40	40.4
Output: MEUI [kWh/(m2 * yr)]	28.5	27.8	27.3	28.5	27.8	27.4	28.4	27.7	27.2	28.5
Output: Better than ERS (%)	20550.0%	20040.0%	19730.0%	20590.0%	20080.0%	19770.0%	20470.0%	19960.0%	19650.0%	20550.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5060.0%	5060.0%	5060.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6741	6741	6741	6763	6763	6763	6687	6687	6687	6741
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 950.52	$ 950.52	$ 950.52	$ 953.57	$ 953.57	$ 953.57	$ 942.81	$ 942.81	$ 942.81	$ 950.52
Annual savings in carbon tax for electricity [$/year]	$ 3.37	$ 3.37	$ 3.37	$ 3.38	$ 3.38	$ 3.38	$ 3.34	$ 3.34	$ 3.34	$ 3.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 953.89	$ 953.89	$ 953.89	$ 956.95	$ 956.95	$ 956.95	$ 946.15	$ 946.15	$ 946.15	$ 953.89
Annual savings in GHG from electricity savings [kg CO2e/year]	74.2	74.2	74.2	74.4	74.4	74.4	73.6	73.6	73.6	74.2
Annual savings in natural gas [m3/year]	195.9	197.18	197.99	195.9	197.17	197.99	195.9	197.17	197.99	195.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,815.05	$ 1,826.85	$ 1,834.41	$ 1,815.05	$ 1,826.82	$ 1,834.38	$ 1,815.01	$ 1,826.82	$ 1,834.38	$ 1,815.05
Annual savings in carbon tax for natural gas [$/year]	$ 453.03	$ 455.97	$ 457.86	$ 453.03	$ 455.97	$ 457.85	$ 453.02	$ 455.97	$ 457.85	$ 453.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,268.07	$ 2,282.83	$ 2,292.27	$ 2,268.07	$ 2,282.78	$ 2,292.23	$ 2,268.03	$ 2,282.78	$ 2,292.23	$ 2,268.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	10067.3	10132.8	10174.7	10067.3	10132.6	10174.5	10067.1	10132.6	10174.5	10067.3
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,249.89	$ 38,756.6	$ 39,021.	$ 39,137.56	$ 39,061.1	$ 39,324.54	$ 39,441.1	$ 39,857.66
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	14.09	14.09	14.09	14.09	14.09	14.09	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.	$ 550.	$ 850.	$.

LARGE 50SAR Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 64,556.05	$ 65,106.05	$ 65,406.05	$ 65,387.3	$ 65,937.3	$ 65,887.3	$ 66,237.3	$ 66,437.3	$ 66,737.3	$ 66,544.05
ICC with multiplier (Van=1.0,this Cz =1)	$ 64,556.05	$ 65,106.05	$ 65,406.05	$ 65,387.3	$ 65,937.3	$ 65,887.3	$ 66,237.3	$ 66,437.3	$ 66,737.3	$ 66,544.05
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,249.89	$ 38,756.6	$ 39,021.	$ 39,061.1	$ 39,137.56	$ 39,324.54	$ 39,441.1	$ 39,857.66
Incremental dollars per GHG saving	$ 6.46	$ 6.47	$ 6.48	$ 6.54	$ 6.56	$ 6.59	$ 6.56	$ 6.61	$ 6.61	$ 6.66
Auxiliary Energy Required Heating [GJ/yr]	74.4	74.4	74.4	74.3	74.3	73.5	74.3	73.5	73.5	74.4
Annual Energy DHW [GJ/yr]	23.8	22.5	21.7	23.8	22.5	23.8	21.7	22.5	21.7	23.8
Annual Energy Space Heating [GJ/yr]	25.7	25.7	25.7	25.8	25.8	25.5	25.8	25.5	25.5	25.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	78.2	76.9	76.1	78.3	77	78	76.2	76.7	75.9	78.2
Design Heating Load [W]	13011.4	13011.4	13011.4	12967.5	12967.5	12944.7	12967.5	12944.7	12944.7	13011.4
Annual Energy Electricity [kWh/yr]	15123	15123	15123	15144.6	15144.6	15068.3	15144.6	15068.3	15068.3	15123
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 2,076.59	$ 2,076.59	$ 2,076.59	$ 2,079.65	$ 2,079.65	$ 2,068.85	$ 2,079.65	$ 2,068.85	$ 2,068.85	$ 2,076.59
Annual Energy Natural Gas [m3/yr]	637.9	603.7	581.8	637.9	603.8	638	581.9	603.8	581.9	637.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 275.17	$ 260.42	$ 250.97	$ 275.17	$ 260.46	$ 275.21	$ 251.01	$ 260.46	$ 251.01	$ 275.17
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	45730	45731	45732	45928	45929	45946	45930	45947	45948	46378
Upgrade Package List	Pkg3331202054	Pkg3331202054	Pkg3331202054	Pkg3331203053	Pkg3331203053	Pkg3331203054	Pkg3331203053	Pkg3331203054	Pkg3331203054	Pkg3331302054
GHGI [kg/m2]	2.72	2.59	2.51	2.72	2.59	2.71	2.51	2.59	2.5	2.72
% ICC	5.7%	5.8%	5.8%	5.8%	5.8%	5.8%	5.9%	5.9%	5.9%	5.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	40.4	40.4	40.4	40.4	40.4	40	40.4	40	40	40.4
Output: MEUI [kWh/(m2 * yr)]	28.5	27.8	27.3	28.5	27.8	28.4	27.4	27.7	27.2	28.5
Output: Better than ERS (%)	20550.0%	20040.0%	19730.0%	20590.0%	20080.0%	20470.0%	19770.0%	19960.0%	19650.0%	20550.0%
Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5060.0%	5000.0%	5060.0%	5060.0%	5000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6741	6741	6741	6763	6763	6687	6763	6687	6687	6741
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 950.52	$ 950.52	$ 950.52	$ 953.57	$ 953.57	$ 942.81	$ 953.57	$ 942.81	$ 942.81	$ 950.52
Annual savings in carbon tax for electricity [$/year]	$ 3.37	$ 3.37	$ 3.37	$ 3.38	$ 3.38	$ 3.34	$ 3.38	$ 3.34	$ 3.34	$ 3.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 953.89	$ 953.89	$ 953.89	$ 956.95	$ 956.95	$ 946.15	$ 956.95	$ 946.15	$ 946.15	$ 953.89
Annual savings in GHG from electricity savings [kg CO2e/year]	74.2	74.2	74.2	74.4	74.4	73.6	74.4	73.6	73.6	74.2
Annual savings in natural gas [m3/year]	195.9	197.18	197.99	195.9	197.17	195.9	197.99	197.17	197.99	195.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,815.05	$ 1,826.85	$ 1,834.41	$ 1,815.05	$ 1,826.82	$ 1,815.01	$ 1,834.38	$ 1,826.82	$ 1,834.38	$ 1,815.05
Annual savings in carbon tax for natural gas [$/year]	$ 453.03	$ 455.97	$ 457.86	$ 453.03	$ 455.97	$ 453.02	$ 457.85	$ 455.97	$ 457.85	$ 453.03
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,268.07	$ 2,282.83	$ 2,292.27	$ 2,268.07	$ 2,282.78	$ 2,268.03	$ 2,292.23	$ 2,282.78	$ 2,292.23	$ 2,268.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	10067.3	10132.8	10174.7	10067.3	10132.6	10067.1	10174.5	10132.6	10174.5	10067.3
Net Present Value [$]	$ 37,869.66	$ 38,133.33	$ 38,249.89	$ 38,756.6	$ 39,021.	$ 39,061.1	$ 39,137.56	$ 39,324.54	$ 39,441.1	$ 39,857.66
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	14.09	14.09	14.09	14.09	14.09	14.09	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 2,431.75	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44	$ 28,056.44
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.

LARGE 50SAR Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 21,775.91	$ 22,237.41	$ 22,275.91	$ 22,325.91	$ 22,625.91	$ 22,737.41	$ 22,784.23	$ 22,787.41	$ 22,825.91	$ 22,875.91
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 23,365.55	$ 23,860.74	$ 23,902.05	$ 23,955.7	$ 24,277.6	$ 24,397.24	$ 24,447.48	$ 24,450.89	$ 24,492.2	$ 24,545.85
Net Present Value [$]	$ 18,333.1	$ 18,642.14	$ 16,851.87	$ 18,597.51	$ 18,713.1	$ 17,118.92	$ 17,887.08	$ 18,905.82	$ 17,115.31	$ 15,741.25
Incremental dollars per GHG saving	$ 1.99	$ 2.03	$ 2.03	$ 2.02	$ 2.04	$ 2.07	$ 2.08	$ 2.07	$ 2.07	$ 1.99
Auxiliary Energy Required Heating [GJ/yr]	146.2	145.5	139.7	146.2	146.2	139	146.6	145.5	139.7	142.4
Annual Energy DHW [GJ/yr]	23.7	23.7	23.7	22.4	21.6	23.7	23.7	22.4	22.4	13.5
Annual Energy Space Heating [GJ/yr]	59.8	59.6	57	59.8	59.8	56.8	59.6	59.6	57	57.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	117.7	117.5	114.9	116.4	115.6	114.7	115.7	116.2	113.7	105.6
Design Heating Load [W]	24049	23904.3	22788.1	24049	24049	22643.3	22788.1	23904.3	22788.1	22596
Annual Energy Electricity [kWh/yr]	26122.4	26062.9	25352.8	26122.4	26122.4	25277.3	25558.1	26062.9	25352.8	25578.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,633.	$ 3,624.59	$ 3,524.11	$ 3,633.	$ 3,633.	$ 3,513.42	$ 3,553.16	$ 3,624.59	$ 3,524.11	$ 3,556.01
Annual Energy Natural Gas [m3/yr]	635.6	635.7	635.6	601.5	579.5	635.6	635.4	601.5	601.4	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.18	$ 274.22	$ 274.18	$ 259.47	$ 249.98	$ 274.18	$ 274.09	$ 259.47	$ 259.42	$ 156.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	1738	2008	11458	1739	1740	11728	11404	2009	11459	11461
Upgrade Package List	Pkg1121101031	Pkg1121102031	Pkg2121101031	Pkg1121101031	Pkg1121101031	Pkg2121102031	Pkg2121101021	Pkg1121102031	Pkg2121101031	Pkg2121101031
GHGI [kg/m2]	2.94	2.94	2.93	2.82	2.73	2.93	2.93	2.81	2.8	1.91
% ICC	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	79.5	79.1	75.9	79.5	79.5	75.5	79.7	79.1	75.9	77.4
Output: MEUI [kWh/(m2 * yr)]	49.4	49.2	47.8	48.7	48.2	47.7	48.4	48.5	47.2	42.8
Output: Better than ERS (%)	35980.0%	35900.0%	34880.0%	35470.0%	35160.0%	34800.0%	35200.0%	35390.0%	34410.0%	31250.0%
Output: Better than Envelope (%)	1110.0%	1150.0%	1500.0%	1110.0%	1110.0%	1550.0%	1080.0%	1150.0%	1500.0%	1340.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17629	17569	16859	17629	17629	16784	17064	17569	16859	17084
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,485.63	$ 2,477.24	$ 2,377.12	$ 2,485.63	$ 2,485.63	$ 2,366.47	$ 2,406.07	$ 2,477.24	$ 2,377.12	$ 2,408.91
Annual savings in carbon tax for electricity [$/year]	$ 8.81	$ 8.78	$ 8.43	$ 8.81	$ 8.81	$ 8.39	$ 8.53	$ 8.78	$ 8.43	$ 8.54
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,494.45	$ 2,486.03	$ 2,385.55	$ 2,494.45	$ 2,494.45	$ 2,374.87	$ 2,414.6	$ 2,486.03	$ 2,385.55	$ 2,417.46
Annual savings in GHG from electricity savings [kg CO2e/year]	193.9	193.3	185.4	193.9	193.9	184.6	187.7	193.3	185.4	187.9
Annual savings in natural gas [m3/year]	217.19	217.19	217.19	218.46	219.28	217.19	217.2	218.46	218.46	227.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,012.26	$ 2,012.23	$ 2,012.26	$ 2,024.03	$ 2,031.63	$ 2,012.26	$ 2,012.33	$ 2,024.03	$ 2,024.07	$ 2,106.68
Annual savings in carbon tax for natural gas [$/year]	$ 502.25	$ 502.24	$ 502.25	$ 505.19	$ 507.08	$ 502.25	$ 502.27	$ 505.19	$ 505.2	$ 525.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,514.51	$ 2,514.47	$ 2,514.51	$ 2,529.22	$ 2,538.71	$ 2,514.51	$ 2,514.6	$ 2,529.22	$ 2,529.27	$ 2,632.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	11161.1	11160.9	11161.1	11226.4	11268.6	11161.1	11161.5	11226.4	11226.6	11684.8
Net Present Value [$]	$ 18,333.1	$ 18,642.14	$ 16,851.87	$ 18,597.51	$ 18,713.1	$ 17,118.92	$ 17,887.08	$ 18,905.82	$ 17,115.31	$ 15,741.25
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,760.96	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.	$.

LARGE 50SAR Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 23,649.91	$ 24,111.41	$ 21,775.91	$ 22,875.91	$ 24,199.91	$ 24,499.91	$ 22,325.91	$ 23,425.91	$ 22,237.41	$ 24,661.41
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 25,376.35	$ 25,871.54	$ 23,365.55	$ 24,545.85	$ 25,966.5	$ 26,288.4	$ 23,955.7	$ 25,136.	$ 23,860.74	$ 26,461.69
Net Present Value [$]	$ 20,170.68	$ 20,994.43	$ 18,333.1	$ 15,741.25	$ 20,251.81	$ 20,250.18	$ 18,597.51	$ 16,049.58	$ 18,642.14	$ 21,074.82
Incremental dollars per GHG saving	$ 1.95	$ 1.98	$ 1.99	$ 1.99	$ 1.99	$ 2.01	$ 2.02	$ 2.03	$ 2.03	$ 2.03
Auxiliary Energy Required Heating [GJ/yr]	146.6	145.9	146.2	142.4	146.3	146.1	146.2	142.5	145.5	145.6
Annual Energy DHW [GJ/yr]	7.8	7.8	23.7	13.5	7.2	6.9	22.4	12.4	23.7	7.2
Annual Energy Space Heating [GJ/yr]	59.4	60	59.8	57.9	59.3	59.3	59.8	57.9	59.6	59.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	101.4	101.9	117.7	105.6	100.8	100.4	116.4	104.5	117.5	101.3
Design Heating Load [W]	22788.1	22643.3	24049	22596	22788.1	22788.1	24049	22596	23904.3	22643.3
Annual Energy Electricity [kWh/yr]	28176.2	28316.9	26122.4	25578.3	27994.1	27876.9	26122.4	25579.4	26062.9	28134.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,923.62	$ 3,943.53	$ 3,633.	$ 3,556.01	$ 3,897.85	$ 3,881.27	$ 3,633.	$ 3,556.17	$ 3,624.59	$ 3,917.72
Annual Energy Natural Gas [m3/yr]	0	0	635.6	362.1	0	0	601.5	332.9	635.7	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 274.18	$ 156.2	$.	$.	$ 259.47	$ 143.6	$ 274.22	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	11734	1738	11461	11465	11466	1739	11462	2008	11735
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg1121101031	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg1121101031	Pkg2121101031	Pkg1121102031	Pkg2121102031
GHGI [kg/m2]	0.61	0.61	2.94	1.91	0.6	0.6	2.82	1.8	2.94	0.61
% ICC	2.1%	2.1%	1.9%	2.0%	2.1%	2.2%	2.0%	2.1%	2.0%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	79.7	79.3	79.5	77.4	79.5	79.4	79.5	77.4	79.1	79.1
Output: MEUI [kWh/(m2 * yr)]	40.5	40.8	49.4	42.8	40.1	39.9	48.7	42.2	49.2	40.4
Output: Better than ERS (%)	29610.0%	29800.0%	35980.0%	31250.0%	29370.0%	29220.0%	35470.0%	30820.0%	35900.0%	29570.0%
Output: Better than Envelope (%)	1080.0%	1130.0%	1110.0%	1340.0%	1100.0%	1110.0%	1110.0%	1330.0%	1150.0%	1140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19682	19823	17629	17084	19500	19383	17629	17086	17569	19641
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,775.22	$ 2,795.06	$ 2,485.63	$ 2,408.91	$ 2,749.54	$ 2,733.02	$ 2,485.63	$ 2,409.07	$ 2,477.24	$ 2,769.34
Annual savings in carbon tax for electricity [$/year]	$ 9.84	$ 9.91	$ 8.81	$ 8.54	$ 9.75	$ 9.69	$ 8.81	$ 8.54	$ 8.78	$ 9.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,785.06	$ 2,804.97	$ 2,494.45	$ 2,417.46	$ 2,759.29	$ 2,742.71	$ 2,494.45	$ 2,417.61	$ 2,486.03	$ 2,779.16
Annual savings in GHG from electricity savings [kg CO2e/year]	216.5	218.1	193.9	187.9	214.5	213.2	193.9	187.9	193.3	216
Annual savings in natural gas [m3/year]	240.87	240.87	217.19	227.38	240.87	240.87	218.46	228.47	217.19	240.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,231.67	$ 2,231.67	$ 2,012.26	$ 2,106.68	$ 2,231.67	$ 2,231.67	$ 2,024.03	$ 2,116.76	$ 2,012.23	$ 2,231.67
Annual savings in carbon tax for natural gas [$/year]	$ 557.02	$ 557.02	$ 502.25	$ 525.82	$ 557.02	$ 557.02	$ 505.19	$ 528.33	$ 502.24	$ 557.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,788.69	$ 2,788.69	$ 2,514.51	$ 2,632.49	$ 2,788.69	$ 2,788.69	$ 2,529.22	$ 2,645.09	$ 2,514.47	$ 2,788.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	12378.1	12378.1	11161.1	11684.8	12378.1	12378.1	11226.4	11740.7	11160.9	12378.1
Net Present Value [$]	$ 20,170.68	$ 20,994.43	$ 18,333.1	$ 15,741.25	$ 20,251.81	$ 20,250.18	$ 18,597.51	$ 16,049.58	$ 18,642.14	$ 21,074.82
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$.	$ 600.	$ 1,374.	$ 1,374.	$.	$ 600.	$.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 550.	$.	$ 550.

LARGE 50SAR Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,875.91	$ 23,425.91	$ 23,337.41	$ 23,725.91	$ 23,887.41	$ 24,187.41	$ 24,372.45	$ 22,275.91	$ 24,675.91	$ 24,922.45
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 24,545.85	$ 25,136.	$ 25,041.04	$ 25,457.9	$ 25,631.19	$ 25,953.09	$ 26,151.64	$ 23,902.05	$ 26,477.25	$ 26,741.79
Net Present Value [$]	$ 15,741.25	$ 16,049.58	$ 16,158.56	$ 16,194.9	$ 16,466.53	$ 16,612.03	$ 16,726.37	$ 16,851.87	$ 17,000.43	$ 17,034.52
Incremental dollars per GHG saving	$ 1.99	$ 2.03	$ 2.03	$ 2.05	$ 2.07	$ 2.09	$ 2.12	$ 2.03	$ 2.15	$ 2.16
Auxiliary Energy Required Heating [GJ/yr]	142.4	142.5	141.7	142.5	141.7	141.7	140.5	139.7	137.9	140.5
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	11.7	12.4	11.7	13.5	23.7	13.5	12.4
Annual Energy Space Heating [GJ/yr]	57.9	57.9	57.8	57.9	57.8	57.8	57.1	57	56.2	57.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1
Total Energy [GJ/yr]	105.6	104.5	105.5	103.8	104.4	103.7	104.9	114.9	104.8	103.8
Design Heating Load [W]	22596	22596	22451.2	22596	22451.2	22451.2	22373.9	22788.1	21927.8	22373.9
Annual Energy Electricity [kWh/yr]	25578.3	25579.4	25561.1	25580.1	25562.1	25562.9	25379.6	25352.8	25368.2	25380.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,556.01	$ 3,556.17	$ 3,553.58	$ 3,556.27	$ 3,553.72	$ 3,553.84	$ 3,527.9	$ 3,524.11	$ 3,526.29	$ 3,528.05
Annual Energy Natural Gas [m3/yr]	362.1	332.9	362.1	314.2	332.9	314.2	362.1	635.6	362.1	332.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.6	$ 156.2	$ 135.53	$ 143.6	$ 135.53	$ 156.2	$ 274.18	$ 156.2	$ 143.6
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11461	11462	11731	11463	11732	11733	13081	11458	11497	13082
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2131101031	Pkg2121101031	Pkg2121101033	Pkg2131101031
GHGI [kg/m2]	1.91	1.8	1.91	1.73	1.8	1.73	2.93	1.9	1.9	1.79
% ICC	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.2%	2.0%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	77.4	77.4	77	77.4	77	77	76.4	75.9	75	76.4
Output: MEUI [kWh/(m2 * yr)]	42.8	42.2	42.7	41.8	42.1	41.8	42.4	47.8	42.3	41.8
Output: Better than ERS (%)	31250.0%	30820.0%	31210.0%	30550.0%	30780.0%	30510.0%	30980.0%	34880.0%	30940.0%	30550.0%
Output: Better than Envelope (%)	1340.0%	1330.0%	1380.0%	1330.0%	1380.0%	1380.0%	1450.0%	1500.0%	1610.0%	1450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17084	17086	17067	17086	17068	17069	16886	16859	16874	16887
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,408.91	$ 2,409.07	$ 2,406.49	$ 2,409.17	$ 2,406.63	$ 2,406.74	$ 2,380.9	$ 2,377.12	$ 2,379.29	$ 2,381.05
Annual savings in carbon tax for electricity [$/year]	$ 8.54	$ 8.54	$ 8.53	$ 8.54	$ 8.53	$ 8.53	$ 8.44	$ 8.43	$ 8.44	$ 8.44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,417.46	$ 2,417.61	$ 2,415.02	$ 2,417.71	$ 2,415.16	$ 2,415.28	$ 2,389.34	$ 2,385.55	$ 2,387.73	$ 2,389.5
Annual savings in GHG from electricity savings [kg CO2e/year]	187.9	187.9	187.7	187.9	187.8	187.8	185.7	185.4	185.6	185.8
Annual savings in natural gas [m3/year]	227.38	228.47	227.38	229.16	228.47	229.16	227.38	217.19	227.38	228.47
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,106.68	$ 2,116.76	$ 2,106.68	$ 2,123.21	$ 2,116.76	$ 2,123.21	$ 2,106.68	$ 2,012.26	$ 2,106.68	$ 2,116.76
Annual savings in carbon tax for natural gas [$/year]	$ 525.82	$ 528.33	$ 525.82	$ 529.94	$ 528.33	$ 529.94	$ 525.82	$ 502.25	$ 525.82	$ 528.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,632.49	$ 2,645.09	$ 2,632.49	$ 2,653.15	$ 2,645.09	$ 2,653.15	$ 2,632.49	$ 2,514.51	$ 2,632.49	$ 2,645.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	11684.8	11740.7	11684.8	11776.5	11740.7	11776.5	11684.8	11161.1	11684.8	11740.7
Net Present Value [$]	$ 15,741.25	$ 16,049.58	$ 16,158.56	$ 16,194.9	$ 16,466.53	$ 16,612.03	$ 16,726.37	$ 16,851.87	$ 17,000.43	$ 17,034.52
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	10.47	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 75	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$ 550.

LARGE 50SAR Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 27,336.79	$ 27,798.29	$ 27,886.79	$ 27,936.79	$ 28,186.79	$ 28,348.29	$ 28,398.29	$ 28,486.79	$ 28,648.29	$ 28,696.79
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 29,332.38	$ 29,827.57	$ 29,922.53	$ 29,976.18	$ 30,244.43	$ 30,417.72	$ 30,471.37	$ 30,566.33	$ 30,739.62	$ 30,791.66
Net Present Value [$]	$ 18,128.49	$ 18,437.35	$ 18,392.17	$ 17,215.24	$ 18,508.73	$ 18,701.03	$ 17,447.42	$ 17,523.39	$ 18,817.59	$ 19,304.45
Incremental dollars per GHG saving	$ 2.49	$ 2.53	$ 2.52	$ 2.43	$ 2.54	$ 2.56	$ 2.47	$ 2.46	$ 2.58	$ 2.61
Auxiliary Energy Required Heating [GJ/yr]	126.7	126	126.7	129.4	126.7	126	128.7	129.5	126	123.7
Annual Energy DHW [GJ/yr]	23.7	23.7	22.4	13.5	21.6	22.4	13.5	12.4	21.6	23.7
Annual Energy Space Heating [GJ/yr]	51.7	51.5	51.7	52.8	51.7	51.5	52.5	52.8	51.5	50.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8
Total Energy [GJ/yr]	109.6	109.4	108.4	100.5	107.6	108.2	100.2	99.5	107.3	109.4
Design Heating Load [W]	21144.4	20999.7	21144.4	20952.3	21144.4	20999.7	20807.5	20952.3	20999.7	20611.8
Annual Energy Electricity [kWh/yr]	23882.6	23823.3	23882.6	24185	23882.6	23823.3	24095.9	24186.1	23823.3	23811.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,316.07	$ 3,307.68	$ 3,316.07	$ 3,358.86	$ 3,316.07	$ 3,307.68	$ 3,346.25	$ 3,359.02	$ 3,307.68	$ 3,305.96
Annual Energy Natural Gas [m3/yr]	635.7	635.7	601.5	362.1	579.6	601.5	362.1	332.9	579.6	635.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 274.22	$ 274.22	$ 259.47	$ 156.2	$ 250.02	$ 259.47	$ 156.2	$ 143.6	$ 250.02	$ 274.22
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17830	18100	17831	17833	17832	18101	18103	17834	18102	17848
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2221102031	Pkg2221101032
GHGI [kg/m2]	2.9	2.89	2.77	1.88	2.69	2.77	1.88	1.77	2.68	2.89
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	68.9	68.5	68.9	70.4	68.9	68.5	70	70.4	68.5	67.2
Output: MEUI [kWh/(m2 * yr)]	45	44.8	44.3	40	43.8	44.2	39.8	39.4	43.7	44.8
Output: Better than ERS (%)	32810.0%	32730.0%	32340.0%	29260.0%	32030.0%	32270.0%	29140.0%	28870.0%	31910.0%	32730.0%
Output: Better than Envelope (%)	2290.0%	2340.0%	2290.0%	2130.0%	2290.0%	2340.0%	2170.0%	2120.0%	2340.0%	2480.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15389	15330	15389	15691	15389	15330	15602	15692	15330	15317
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,169.82	$ 2,161.46	$ 2,169.82	$ 2,212.46	$ 2,169.82	$ 2,161.46	$ 2,199.9	$ 2,212.61	$ 2,161.46	$ 2,159.74
Annual savings in carbon tax for electricity [$/year]	$ 7.69	$ 7.66	$ 7.69	$ 7.85	$ 7.69	$ 7.66	$ 7.8	$ 7.85	$ 7.66	$ 7.66
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,177.52	$ 2,169.12	$ 2,177.52	$ 2,220.3	$ 2,177.52	$ 2,169.12	$ 2,207.7	$ 2,220.46	$ 2,169.12	$ 2,167.4
Annual savings in GHG from electricity savings [kg CO2e/year]	169.3	168.6	169.3	172.6	169.3	168.6	171.6	172.6	168.6	168.5
Annual savings in natural gas [m3/year]	217.19	217.19	218.46	227.38	219.28	218.46	227.38	228.47	219.28	217.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,012.23	$ 2,012.23	$ 2,024.03	$ 2,106.68	$ 2,031.59	$ 2,024.03	$ 2,106.68	$ 2,116.76	$ 2,031.59	$ 2,012.23
Annual savings in carbon tax for natural gas [$/year]	$ 502.24	$ 502.24	$ 505.19	$ 525.82	$ 507.08	$ 505.19	$ 525.82	$ 528.33	$ 507.08	$ 502.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,514.47	$ 2,514.47	$ 2,529.22	$ 2,632.49	$ 2,538.67	$ 2,529.22	$ 2,632.49	$ 2,645.09	$ 2,538.67	$ 2,514.47
Annual savings in GHG from natural gas savings [kg CO2e/year]	11160.9	11160.9	11226.4	11684.8	11268.4	11226.4	11684.8	11740.7	11268.4	11160.9
Net Present Value [$]	$ 18,128.49	$ 18,437.35	$ 18,392.17	$ 17,215.24	$ 18,508.73	$ 18,701.03	$ 17,447.42	$ 17,523.39	$ 18,817.59	$ 19,304.45
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$.

LARGE 50SAR Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,936.79	$ 28,486.79	$ 28,398.29	$ 30,070.79	$ 28,786.79	$ 27,336.79	$ 28,948.29	$ 30,510.79	$ 30,532.29	$ 30,620.79
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 29,976.18	$ 30,566.33	$ 30,471.37	$ 32,265.96	$ 30,888.23	$ 29,332.38	$ 31,061.52	$ 32,738.08	$ 32,761.15	$ 32,856.11
Net Present Value [$]	$ 17,215.24	$ 17,523.39	$ 17,447.42	$ 22,607.01	$ 17,668.71	$ 18,128.49	$ 17,755.57	$ 22,680.75	$ 22,880.81	$ 22,688.68
Incremental dollars per GHG saving	$ 2.43	$ 2.46	$ 2.47	$ 2.47	$ 2.48	$ 2.49	$ 2.5	$ 2.51	$ 2.51	$ 2.51
Auxiliary Energy Required Heating [GJ/yr]	129.4	129.5	128.7	130.5	129.5	126.7	128.7	129.1	129.7	130.2
Annual Energy DHW [GJ/yr]	13.5	12.4	13.5	7.8	11.7	23.7	12.4	7.8	7.8	7.2
Annual Energy Space Heating [GJ/yr]	52.8	52.8	52.5	53	52.8	51.7	52.5	52.5	52.8	52.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.8	1.1	1.1	1.1	1.8	1.8	1.8
Total Energy [GJ/yr]	100.5	99.5	100.2	95.9	98.8	109.6	99.1	95.4	95.6	95.2
Design Heating Load [W]	20952.3	20952.3	20807.5	20611.8	20952.3	21144.4	20807.5	20476.3	20467.1	20611.8
Annual Energy Electricity [kWh/yr]	24185	24186.1	24095.9	26628.5	24186.8	23882.6	24097	26486.2	26555.6	26446.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,358.86	$ 3,359.02	$ 3,346.25	$ 3,704.62	$ 3,359.12	$ 3,316.07	$ 3,346.41	$ 3,684.48	$ 3,694.3	$ 3,678.88
Annual Energy Natural Gas [m3/yr]	362.1	332.9	362.1	0	314.2	635.7	332.9	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 143.6	$ 156.2	$.	$ 135.53	$ 274.22	$ 143.6	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	17834	18103	17854	17835	17830	18104	17872	18124	17855
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101032	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101033	Pkg2221102032	Pkg2221101032
GHGI [kg/m2]	1.88	1.77	1.88	0.57	1.7	2.9	1.77	0.57	0.57	0.57
% ICC	2.5%	2.5%	2.5%	2.7%	2.6%	2.4%	2.6%	2.7%	2.7%	2.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	70.4	70.4	70	70.9	70.4	68.9	70	70.2	70.5	70.8
Output: MEUI [kWh/(m2 * yr)]	40	39.4	39.8	37.5	39	45	39.3	37.2	37.3	37.1
Output: Better than ERS (%)	29260.0%	28870.0%	29140.0%	27460.0%	28590.0%	32810.0%	28710.0%	27270.0%	27340.0%	27190.0%
Output: Better than Envelope (%)	2130.0%	2120.0%	2170.0%	2060.0%	2120.0%	2290.0%	2170.0%	2150.0%	2110.0%	2080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15691	15692	15602	18135	15693	15389	15603	17992	18062	17953
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,212.46	$ 2,212.61	$ 2,199.9	$ 2,556.99	$ 2,212.71	$ 2,169.82	$ 2,200.05	$ 2,536.93	$ 2,546.71	$ 2,531.34
Annual savings in carbon tax for electricity [$/year]	$ 7.85	$ 7.85	$ 7.8	$ 9.07	$ 7.85	$ 7.69	$ 7.8	$ 9.	$ 9.03	$ 8.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,220.3	$ 2,220.46	$ 2,207.7	$ 2,566.06	$ 2,220.56	$ 2,177.52	$ 2,207.85	$ 2,545.92	$ 2,555.74	$ 2,540.32
Annual savings in GHG from electricity savings [kg CO2e/year]	172.6	172.6	171.6	199.5	172.6	169.3	171.6	197.9	198.7	197.5
Annual savings in natural gas [m3/year]	227.38	228.47	227.38	240.87	229.16	217.19	228.47	240.87	240.87	240.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,106.68	$ 2,116.76	$ 2,106.68	$ 2,231.67	$ 2,123.21	$ 2,012.23	$ 2,116.76	$ 2,231.67	$ 2,231.67	$ 2,231.67
Annual savings in carbon tax for natural gas [$/year]	$ 525.82	$ 528.33	$ 525.82	$ 557.02	$ 529.94	$ 502.24	$ 528.33	$ 557.02	$ 557.02	$ 557.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,632.49	$ 2,645.09	$ 2,632.49	$ 2,788.69	$ 2,653.15	$ 2,514.47	$ 2,645.09	$ 2,788.69	$ 2,788.69	$ 2,788.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	11684.8	11740.7	11684.8	12378.1	11776.5	11160.9	11740.7	12378.1	12378.1	12378.1
Net Present Value [$]	$ 17,215.24	$ 17,523.39	$ 17,447.42	$ 22,607.01	$ 17,668.71	$ 18,128.49	$ 17,755.57	$ 22,680.75	$ 22,880.81	$ 22,688.68
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	HRV sre 60	NA	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,360.	$.	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$.	$ 550.	$.	$.	$ 550.

LARGE 50SAR Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,936.79	$ 28,398.29	$ 28,486.79	$ 28,786.79	$ 28,948.29	$ 29,248.29	$ 27,336.79	$ 29,433.33	$ 29,296.79	$ 29,736.79
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 29,976.18	$ 30,471.37	$ 30,566.33	$ 30,888.23	$ 31,061.52	$ 31,383.42	$ 29,332.38	$ 31,581.96	$ 31,435.46	$ 31,907.58
Net Present Value [$]	$ 17,215.24	$ 17,447.42	$ 17,523.39	$ 17,668.71	$ 17,755.57	$ 17,900.89	$ 18,128.49	$ 18,148.14	$ 18,188.53	$ 18,263.54
Incremental dollars per GHG saving	$ 2.43	$ 2.47	$ 2.46	$ 2.48	$ 2.5	$ 2.52	$ 2.49	$ 2.56	$ 2.54	$ 2.58
Auxiliary Energy Required Heating [GJ/yr]	129.4	128.7	129.5	129.5	128.7	128.7	126.7	127.5	126.4	125
Annual Energy DHW [GJ/yr]	13.5	13.5	12.4	11.7	12.4	11.7	23.7	13.5	13.5	13.5
Annual Energy Space Heating [GJ/yr]	52.8	52.5	52.8	52.8	52.5	52.5	51.7	52	51.5	51
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.8
Total Energy [GJ/yr]	100.5	100.2	99.5	98.8	99.1	98.5	109.6	99.8	100	99.5
Design Heating Load [W]	20952.3	20807.5	20952.3	20952.3	20807.5	20807.5	21144.4	20730.2	20419.7	20284.2
Annual Energy Electricity [kWh/yr]	24185	24095.9	24186.1	24186.8	24097	24097.7	23882.6	23966.1	24034.8	23893
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,358.86	$ 3,346.25	$ 3,359.02	$ 3,359.12	$ 3,346.41	$ 3,346.51	$ 3,316.07	$ 3,327.89	$ 3,337.61	$ 3,317.54
Annual Energy Natural Gas [m3/yr]	362.1	362.1	332.9	314.2	332.9	314.2	635.7	362.1	362.1	362.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 156.2	$ 156.2	$ 143.6	$ 135.53	$ 143.6	$ 135.53	$ 274.22	$ 156.2	$ 156.2	$ 156.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	18103	17834	17835	18104	18105	17830	20965	17851	17869
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2231101031	Pkg2221101032	Pkg2221101033
GHGI [kg/m2]	1.88	1.88	1.77	1.77	1.77	1.77	2.9	1.87	1.87	1.87
% ICC	2.5%	2.5%	2.5%	2.6%	2.6%	2.6%	2.4%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	70.4	70	70.4	70.4	70	70	68.9	69.3	68.7	67.9
Output: MEUI [kWh/(m2 * yr)]	40	39.8	39.4	39	39.3	38.9	45	39.6	39.7	39.4
Output: Better than ERS (%)	29260.0%	29140.0%	28870.0%	28590.0%	28710.0%	28480.0%	32810.0%	28980.0%	29060.0%	28870.0%
Output: Better than Envelope (%)	2130.0%	2170.0%	2120.0%	2120.0%	2170.0%	2170.0%	2290.0%	2240.0%	2310.0%	2400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15691	15602	15692	15693	15603	15604	15389	15472	15541	15399
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,212.46	$ 2,199.9	$ 2,212.61	$ 2,212.71	$ 2,200.05	$ 2,200.15	$ 2,169.82	$ 2,181.59	$ 2,191.28	$ 2,171.29
Annual savings in carbon tax for electricity [$/year]	$ 7.85	$ 7.8	$ 7.85	$ 7.85	$ 7.8	$ 7.8	$ 7.69	$ 7.74	$ 7.77	$ 7.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,220.3	$ 2,207.7	$ 2,220.46	$ 2,220.56	$ 2,207.85	$ 2,207.95	$ 2,177.52	$ 2,189.33	$ 2,199.05	$ 2,178.99
Annual savings in GHG from electricity savings [kg CO2e/year]	172.6	171.6	172.6	172.6	171.6	171.6	169.3	170.2	171	169.4
Annual savings in natural gas [m3/year]	227.38	227.38	228.47	229.16	228.47	229.16	217.19	227.38	227.38	227.38
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,106.68	$ 2,106.68	$ 2,116.76	$ 2,123.21	$ 2,116.76	$ 2,123.21	$ 2,012.23	$ 2,106.68	$ 2,106.68	$ 2,106.68
Annual savings in carbon tax for natural gas [$/year]	$ 525.82	$ 525.82	$ 528.33	$ 529.94	$ 528.33	$ 529.94	$ 502.24	$ 525.82	$ 525.82	$ 525.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,632.49	$ 2,632.49	$ 2,645.09	$ 2,653.15	$ 2,645.09	$ 2,653.15	$ 2,514.47	$ 2,632.49	$ 2,632.49	$ 2,632.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	11684.8	11684.8	11740.7	11776.5	11740.7	11776.5	11160.9	11684.8	11684.8	11684.8
Net Present Value [$]	$ 17,215.24	$ 17,447.42	$ 17,523.39	$ 17,668.71	$ 17,755.57	$ 17,900.89	$ 18,128.49	$ 18,148.14	$ 18,188.53	$ 18,263.54
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$.

LARGE 50SAR Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 22,275.91	$ 22,737.41	$ 22,825.91	$ 23,125.91	$ 23,287.41	$ 23,587.41	$ 23,635.91	$ 23,772.45	$ 24,075.91	$ 24,097.41
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,082.67	$ 25,602.32	$ 25,701.97	$ 26,039.77	$ 26,221.62	$ 26,559.42	$ 26,614.03	$ 26,767.78	$ 27,109.47	$ 27,133.68
Net Present Value [$]	$ 11,455.5	$ 11,671.48	$ 11,688.12	$ 11,782.11	$ 11,903.85	$ 11,997.85	$ 12,261.77	$ 12,308.37	$ 12,231.43	$ 12,490.29
Incremental dollars per GHG saving	$ 1.57	$ 1.6	$ 1.6	$ 1.61	$ 1.63	$ 1.65	$ 1.66	$ 1.67	$ 1.69	$ 1.7
Auxiliary Energy Required Heating [GJ/yr]	190.7	189.7	190.7	190.7	189.7	189.7	186.7	188.3	184.9	185.7
Annual Energy DHW [GJ/yr]	24.7	24.7	23.3	22.4	23.3	22.4	24.7	24.7	24.7	24.7
Annual Energy Space Heating [GJ/yr]	73.4	73	73.4	73.4	73	73	71.9	72.5	71.2	71.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.8
Total Energy [GJ/yr]	129.7	129.3	128.3	127.3	127.9	127	128.9	128.8	128.2	128.6
Design Heating Load [W]	29550.5	29362.6	29550.5	29550.5	29362.6	29362.6	28859.5	29290.4	28683.7	28671.7
Annual Energy Electricity [kWh/yr]	29159.5	29063.7	29159.5	29159.5	29063.7	29063.7	28944	28910.1	28761	28853.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,062.75	$ 4,049.2	$ 4,062.75	$ 4,062.75	$ 4,049.2	$ 4,049.2	$ 4,032.26	$ 4,027.46	$ 4,006.37	$ 4,019.41
Annual Energy Natural Gas [m3/yr]	663.3	663.4	625.4	600.8	625.5	600.9	663.4	663.1	663.5	663.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.12	$ 286.17	$ 269.78	$ 259.16	$ 269.82	$ 259.21	$ 286.17	$ 286.04	$ 286.21	$ 286.21
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11458	11728	11459	11460	11729	11730	11476	13078	11494	11746
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121102031	Pkg2121101032	Pkg2131101031	Pkg2121101033	Pkg2121102032
GHGI [kg/m2]	3.11	3.11	2.97	2.88	2.97	2.88	3.11	3.11	3.11	3.11
% ICC	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	103.7	103.1	103.7	103.7	103.1	103.1	101.5	102.4	100.5	101
Output: MEUI [kWh/(m2 * yr)]	56.1	55.9	55.3	54.8	55.2	54.7	55.7	55.6	55.3	55.5
Output: Better than ERS (%)	40660.0%	40510.0%	40120.0%	39730.0%	39960.0%	39610.0%	40350.0%	40310.0%	40080.0%	40230.0%
Output: Better than Envelope (%)	1060.0%	1100.0%	1060.0%	1060.0%	1100.0%	1100.0%	1240.0%	1170.0%	1330.0%	1290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	20328	20232	20328	20328	20232	20232	20112	20078	19929	20022
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,866.23	$ 2,852.73	$ 2,866.23	$ 2,866.23	$ 2,852.73	$ 2,852.73	$ 2,835.85	$ 2,831.07	$ 2,810.05	$ 2,823.05
Annual savings in carbon tax for electricity [$/year]	$ 10.16	$ 10.12	$ 10.16	$ 10.16	$ 10.12	$ 10.12	$ 10.06	$ 10.04	$ 9.96	$ 10.01
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,876.4	$ 2,862.84	$ 2,876.4	$ 2,876.4	$ 2,862.84	$ 2,862.84	$ 2,845.9	$ 2,841.11	$ 2,820.01	$ 2,833.06
Annual savings in GHG from electricity savings [kg CO2e/year]	223.6	222.6	223.6	223.6	222.6	222.6	221.2	220.9	219.2	220.2
Annual savings in natural gas [m3/year]	280.92	280.91	282.33	283.25	282.33	283.24	280.91	280.92	280.91	280.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,602.7	$ 2,602.66	$ 2,615.78	$ 2,624.27	$ 2,615.75	$ 2,624.24	$ 2,602.66	$ 2,602.77	$ 2,602.63	$ 2,602.63
Annual savings in carbon tax for natural gas [$/year]	$ 649.62	$ 649.61	$ 652.89	$ 655.01	$ 652.88	$ 655.	$ 649.61	$ 649.64	$ 649.6	$ 649.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,252.32	$ 3,252.28	$ 3,268.67	$ 3,279.28	$ 3,268.63	$ 3,279.24	$ 3,252.28	$ 3,252.41	$ 3,252.23	$ 3,252.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	14436	14435.8	14508.6	14555.7	14508.4	14555.5	14435.8	14436.4	14435.6	14435.6
Net Present Value [$]	$ 11,455.5	$ 11,671.48	$ 11,688.12	$ 11,782.11	$ 11,903.85	$ 11,997.85	$ 12,261.77	$ 12,308.37	$ 12,231.43	$ 12,490.29
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	HRV sre 75	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$.

LARGE 50SAR Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 22,275.91	$ 22,825.91	$ 22,737.41	$ 23,125.91	$ 23,287.41	$ 24,235.91	$ 23,587.41	$ 24,372.45	$ 23,635.91	$ 23,772.45
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 25,082.67	$ 25,701.97	$ 25,602.32	$ 26,039.77	$ 26,221.62	$ 27,289.63	$ 26,559.42	$ 27,443.38	$ 26,614.03	$ 26,767.78
Net Present Value [$]	$ 11,455.5	$ 11,688.12	$ 11,671.48	$ 11,782.11	$ 11,903.85	$ 11,051.9	$ 11,997.85	$ 11,107.19	$ 12,261.77	$ 12,308.37
Incremental dollars per GHG saving	$ 1.57	$ 1.6	$ 1.6	$ 1.61	$ 1.63	$ 1.64	$ 1.65	$ 1.65	$ 1.66	$ 1.67
Auxiliary Energy Required Heating [GJ/yr]	190.7	190.7	189.7	190.7	189.7	189.3	189.7	190.9	186.7	188.3
Annual Energy DHW [GJ/yr]	24.7	23.3	24.7	22.4	23.3	14.3	22.4	14.3	24.7	24.7
Annual Energy Space Heating [GJ/yr]	73.4	73.4	73	73.4	73	72.7	73	73.2	71.9	72.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1	1.8	1.1
Total Energy [GJ/yr]	129.7	128.3	129.3	127.3	127.9	119.2	127	119.1	128.9	128.8
Design Heating Load [W]	29550.5	29550.5	29362.6	29550.5	29362.6	28570.3	29362.6	29001.2	28859.5	29290.4
Annual Energy Electricity [kWh/yr]	29159.5	29159.5	29063.7	29159.5	29063.7	29154.3	29063.7	29122.7	28944	28910.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,062.75	$ 4,062.75	$ 4,049.2	$ 4,062.75	$ 4,049.2	$ 4,062.02	$ 4,049.2	$ 4,057.55	$ 4,032.26	$ 4,027.46
Annual Energy Natural Gas [m3/yr]	663.3	625.4	663.4	600.8	625.5	382.7	600.9	382.7	663.4	663.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.12	$ 269.78	$ 286.17	$ 259.16	$ 269.82	$ 165.08	$ 259.21	$ 165.08	$ 286.17	$ 286.04
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11458	11459	11728	11460	11729	11479	11730	13081	11476	13078
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121101032	Pkg2121102031	Pkg2131101031	Pkg2121101032	Pkg2131101031
GHGI [kg/m2]	3.11	2.97	3.11	2.88	2.97	2.06	2.88	2.06	3.11	3.11
% ICC	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.2%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	103.7	103.7	103.1	103.7	103.1	102.9	103.1	103.8	101.5	102.4
Output: MEUI [kWh/(m2 * yr)]	56.1	55.3	55.9	54.8	55.2	50.4	54.7	50.4	55.7	55.6
Output: Better than ERS (%)	40660.0%	40120.0%	40510.0%	39730.0%	39960.0%	36560.0%	39610.0%	36520.0%	40350.0%	40310.0%
Output: Better than Envelope (%)	1060.0%	1060.0%	1100.0%	1060.0%	1100.0%	1120.0%	1100.0%	1050.0%	1240.0%	1170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	20328	20328	20232	20328	20232	20323	20232	20291	20112	20078
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,866.23	$ 2,866.23	$ 2,852.73	$ 2,866.23	$ 2,852.73	$ 2,865.5	$ 2,852.73	$ 2,861.05	$ 2,835.85	$ 2,831.07
Annual savings in carbon tax for electricity [$/year]	$ 10.16	$ 10.16	$ 10.12	$ 10.16	$ 10.12	$ 10.16	$ 10.12	$ 10.15	$ 10.06	$ 10.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,876.4	$ 2,876.4	$ 2,862.84	$ 2,876.4	$ 2,862.84	$ 2,875.66	$ 2,862.84	$ 2,871.19	$ 2,845.9	$ 2,841.11
Annual savings in GHG from electricity savings [kg CO2e/year]	223.6	223.6	222.6	223.6	222.6	223.5	222.6	223.2	221.2	220.9
Annual savings in natural gas [m3/year]	280.92	282.33	280.91	283.25	282.33	291.37	283.24	291.37	280.91	280.92
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,602.7	$ 2,615.78	$ 2,602.66	$ 2,624.27	$ 2,615.75	$ 2,699.56	$ 2,624.24	$ 2,699.56	$ 2,602.66	$ 2,602.77
Annual savings in carbon tax for natural gas [$/year]	$ 649.62	$ 652.89	$ 649.61	$ 655.01	$ 652.88	$ 673.8	$ 655.	$ 673.8	$ 649.61	$ 649.64
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,252.32	$ 3,268.67	$ 3,252.28	$ 3,279.28	$ 3,268.63	$ 3,373.36	$ 3,279.24	$ 3,373.36	$ 3,252.28	$ 3,252.41
Annual savings in GHG from natural gas savings [kg CO2e/year]	14436	14508.6	14435.8	14555.7	14508.4	14973.3	14555.5	14973.3	14435.8	14436.4
Net Present Value [$]	$ 11,455.5	$ 11,688.12	$ 11,671.48	$ 11,782.11	$ 11,903.85	$ 11,051.9	$ 11,997.85	$ 11,107.19	$ 12,261.77	$ 12,308.37
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 60	NA	NA	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,360.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 850.	$.	$.	$.

LARGE 50SAR Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,936.79	$ 28,398.29	$ 28,486.79	$ 28,786.79	$ 24,675.91	$ 28,948.29	$ 24,235.91	$ 24,372.45	$ 29,248.29	$ 25,137.41
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 31,456.83	$ 31,976.47	$ 32,076.13	$ 32,413.93	$ 27,785.07	$ 32,595.77	$ 27,289.63	$ 27,443.38	$ 32,933.57	$ 28,304.72
Net Present Value [$]	$ 10,545.11	$ 10,767.24	$ 10,827.84	$ 10,954.12	$ 11,021.38	$ 11,049.79	$ 11,051.9	$ 11,107.19	$ 11,175.88	$ 11,252.82
Incremental dollars per GHG saving	$ 1.89	$ 1.92	$ 1.92	$ 1.94	$ 1.67	$ 1.95	$ 1.64	$ 1.65	$ 1.97	$ 1.7
Auxiliary Energy Required Heating [GJ/yr]	175.9	175	176	176	187.5	175	189.3	190.9	175	186.6
Annual Energy DHW [GJ/yr]	14.3	14.3	13	12.3	14.3	13	14.3	14.3	12.3	14.3
Annual Energy Space Heating [GJ/yr]	67.6	67.2	67.6	67.6	72	67.2	72.7	73.2	67.2	71.7
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.1	1.8
Total Energy [GJ/yr]	113.3	113	112.1	111.3	118.6	111.8	119.2	119.1	111	118.2
Design Heating Load [W]	27128.9	26941.1	27128.9	27128.9	28394.4	26941.1	28570.3	29001.2	26941.1	28206.6
Annual Energy Electricity [kWh/yr]	27519.9	27426.9	27521.2	27522	28971.5	27428.1	29154.3	29122.7	27428.9	28882.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,830.75	$ 3,817.59	$ 3,830.93	$ 3,831.05	$ 4,036.15	$ 3,817.76	$ 4,062.02	$ 4,057.55	$ 3,817.87	$ 4,023.52
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	329.4	382.7	350.4	382.7	382.7	329.4	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 142.09	$ 165.08	$ 151.15	$ 165.08	$ 165.08	$ 142.09	$ 165.08
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	18103	17834	17835	11497	18104	11479	13081	18105	11767
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2121101033	Pkg2221102031	Pkg2121101032	Pkg2131101031	Pkg2221102031	Pkg2121102033
GHGI [kg/m2]	2.03	2.02	1.91	1.83	2.06	1.9	2.06	1.82	2.06	2.06
% ICC	2.5%	2.5%	2.5%	2.6%	2.2%	2.6%	2.1%	2.2%	2.6%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	95.6	95.1	95.6	95.7	101.9	95.1	102.9	103.8	95.1	101.4
Output: MEUI [kWh/(m2 * yr)]	47.2	47	46.6	46.1	50.1	46.4	50.4	50.4	46	49.9
Output: Better than ERS (%)	34260.0%	34140.0%	33790.0%	33480.0%	36330.0%	33670.0%	36560.0%	36520.0%	33360.0%	36170.0%
Output: Better than Envelope (%)	1750.0%	1790.0%	1740.0%	1740.0%	1210.0%	1790.0%	1120.0%	1050.0%	1790.0%	1250.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18688	18595	18690	18690	20140	18596	20323	20291	18597	20051
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,635.05	$ 2,621.94	$ 2,635.23	$ 2,635.35	$ 2,839.73	$ 2,622.11	$ 2,865.5	$ 2,861.05	$ 2,622.22	$ 2,827.13
Annual savings in carbon tax for electricity [$/year]	$ 9.34	$ 9.3	$ 9.34	$ 9.35	$ 10.07	$ 9.3	$ 10.16	$ 10.15	$ 9.3	$ 10.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,644.39	$ 2,631.23	$ 2,644.58	$ 2,644.69	$ 2,849.8	$ 2,631.4	$ 2,875.66	$ 2,871.19	$ 2,631.52	$ 2,837.16
Annual savings in GHG from electricity savings [kg CO2e/year]	205.6	204.5	205.6	205.6	221.5	204.6	223.5	223.2	204.6	220.6
Annual savings in natural gas [m3/year]	291.37	291.37	292.58	293.36	291.37	292.58	291.37	291.37	293.36	291.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,699.56	$ 2,699.56	$ 2,710.71	$ 2,717.96	$ 2,699.56	$ 2,710.71	$ 2,699.56	$ 2,699.56	$ 2,717.96	$ 2,699.56
Annual savings in carbon tax for natural gas [$/year]	$ 673.8	$ 673.8	$ 676.58	$ 678.39	$ 673.8	$ 676.58	$ 673.8	$ 673.8	$ 678.39	$ 673.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,373.36	$ 3,373.36	$ 3,387.29	$ 3,396.35	$ 3,373.36	$ 3,387.29	$ 3,373.36	$ 3,373.36	$ 3,396.35	$ 3,373.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	14973.3	14973.3	15035.1	15075.3	14973.3	15035.1	14973.3	14973.3	15075.3	14973.3
Net Present Value [$]	$ 10,545.11	$ 10,767.24	$ 10,827.84	$ 10,954.12	$ 11,021.38	$ 11,049.79	$ 11,051.9	$ 11,107.19	$ 11,175.88	$ 11,252.82
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 10,894.95	$ 15,955.83	$ 10,894.95	$ 10,894.95	$ 15,955.83	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 60	NA	NA	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,800.	$.	$ 1,360.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$.	$ 550.	$.	$.	$ 850.	$.

LARGE 50SAR Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 28,696.79	$ 29,136.79	$ 29,158.29	$ 29,246.79	$ 29,294.83	$ 29,546.79	$ 29,598.29	$ 29,686.79	$ 29,708.29	$ 29,736.79
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 32,312.59	$ 32,808.03	$ 32,832.23	$ 32,931.89	$ 32,985.98	$ 33,269.69	$ 33,327.67	$ 33,427.33	$ 33,451.53	$ 33,483.63
Net Present Value [$]	$ 12,538.01	$ 12,508.03	$ 12,766.9	$ 12,770.63	$ 12,829.44	$ 12,864.38	$ 12,724.51	$ 12,740.65	$ 12,999.51	$ 11,302.
Incremental dollars per GHG saving	$ 2.02	$ 2.05	$ 2.05	$ 2.04	$ 2.06	$ 2.06	$ 2.08	$ 2.08	$ 2.08	$ 2.01
Auxiliary Energy Required Heating [GJ/yr]	169.3	167.5	168.4	169.3	169.9	169.3	166.6	167.5	168.4	170.2
Annual Energy DHW [GJ/yr]	24.7	24.7	24.7	23.3	24.7	22.4	24.7	23.3	23.3	14.3
Annual Energy Space Heating [GJ/yr]	65.3	64.7	65	65.3	65.6	65.3	64.3	64.7	65	65.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.1	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	122.2	121.6	121.9	120.8	121.8	119.9	121.2	120.1	120.5	111.9
Design Heating Load [W]	26727.2	26551.3	26539.4	26727.2	26970.2	26727.2	26363.5	26551.3	26539.4	26262.1
Annual Energy Electricity [kWh/yr]	27085.2	26902.4	26994.6	27085.2	26966.8	27085.2	26807.2	26902.4	26994.6	27114.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,769.24	$ 3,743.37	$ 3,756.42	$ 3,769.24	$ 3,752.49	$ 3,769.24	$ 3,729.9	$ 3,743.37	$ 3,756.42	$ 3,773.42
Annual Energy Natural Gas [m3/yr]	663.5	663.6	663.6	625.6	663.3	601	663.6	625.7	625.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 286.21	$ 286.25	$ 286.25	$ 269.86	$ 286.12	$ 259.25	$ 286.25	$ 269.91	$ 269.91	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17848	17866	18118	17849	21232	17850	18136	17867	18119	17869
Upgrade Package List	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2231102031	Pkg2221101032	Pkg2221102033	Pkg2221101033	Pkg2221102032	Pkg2221101033
GHGI [kg/m2]	3.07	3.07	3.07	2.83	3.07	2.83	3.06	2.92	2.93	2.02
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92	91.1	91.5	92	92.4	92	90.6	91.1	91.5	92.5
Output: MEUI [kWh/(m2 * yr)]	52.1	51.7	51.9	51.3	51.8	50.8	51.5	50.9	51.1	46.4
Output: Better than ERS (%)	37730.0%	37500.0%	37620.0%	37190.0%	37580.0%	36840.0%	37340.0%	36910.0%	37070.0%	33710.0%
Output: Better than Envelope (%)	2060.0%	2140.0%	2100.0%	2060.0%	2030.0%	2060.0%	2190.0%	2140.0%	2100.0%	2020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18254	18071	18163	18254	18135	18254	17976	18071	18163	18283
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,573.76	$ 2,547.98	$ 2,560.98	$ 2,573.76	$ 2,557.06	$ 2,573.76	$ 2,534.56	$ 2,547.98	$ 2,560.98	$ 2,577.92
Annual savings in carbon tax for electricity [$/year]	$ 9.13	$ 9.04	$ 9.08	$ 9.13	$ 9.07	$ 9.13	$ 8.99	$ 9.04	$ 9.08	$ 9.14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,582.88	$ 2,557.02	$ 2,570.06	$ 2,582.88	$ 2,566.13	$ 2,582.88	$ 2,543.55	$ 2,557.02	$ 2,570.06	$ 2,587.06
Annual savings in GHG from electricity savings [kg CO2e/year]	200.8	198.8	199.8	200.8	199.5	200.8	197.7	198.8	199.8	201.1
Annual savings in natural gas [m3/year]	280.91	280.91	280.91	282.32	280.92	283.24	280.91	282.32	282.32	291.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,602.63	$ 2,602.6	$ 2,602.6	$ 2,615.71	$ 2,602.7	$ 2,624.21	$ 2,602.6	$ 2,615.68	$ 2,615.68	$ 2,699.56
Annual savings in carbon tax for natural gas [$/year]	$ 649.6	$ 649.6	$ 649.6	$ 652.87	$ 649.62	$ 654.99	$ 649.6	$ 652.86	$ 652.86	$ 673.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,252.23	$ 3,252.19	$ 3,252.19	$ 3,268.58	$ 3,252.32	$ 3,279.19	$ 3,252.19	$ 3,268.54	$ 3,268.54	$ 3,373.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	14435.6	14435.5	14435.5	14508.2	14436	14555.3	14435.5	14508	14508	14973.3
Net Present Value [$]	$ 12,538.01	$ 12,508.03	$ 12,766.9	$ 12,770.63	$ 12,829.44	$ 12,864.38	$ 12,724.51	$ 12,740.65	$ 12,999.51	$ 11,302.
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$ 550.	$.

LARGE 50SAR Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 29,736.79	$ 28,696.79	$ 30,286.79	$ 30,198.29	$ 29,246.79	$ 29,136.79	$ 29,158.29	$ 30,586.79	$ 29,294.83	$ 29,546.79
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 33,483.63	$ 32,312.59	$ 34,102.93	$ 34,003.27	$ 32,931.89	$ 32,808.03	$ 32,832.23	$ 34,440.73	$ 32,985.98	$ 33,269.69
Net Present Value [$]	$ 11,302.	$ 12,538.01	$ 11,584.73	$ 11,523.03	$ 12,770.63	$ 12,508.03	$ 12,766.9	$ 11,710.64	$ 12,829.44	$ 12,864.38
Incremental dollars per GHG saving	$ 2.01	$ 2.02	$ 2.04	$ 2.04	$ 2.04	$ 2.05	$ 2.05	$ 2.06	$ 2.06	$ 2.06
Auxiliary Energy Required Heating [GJ/yr]	170.2	169.3	170.2	169.2	169.3	167.5	168.4	170.2	169.9	169.3
Annual Energy DHW [GJ/yr]	14.3	24.7	13	14.3	23.3	24.7	24.7	12.3	24.7	22.4
Annual Energy Space Heating [GJ/yr]	65.4	65.3	65.4	65.1	65.3	64.7	65	65.5	65.6	65.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.1	1.8
Total Energy [GJ/yr]	111.9	122.2	110.7	111.5	120.8	121.6	121.9	109.9	121.8	119.9
Design Heating Load [W]	26262.1	26727.2	26262.1	26074.2	26727.2	26551.3	26539.4	26262.1	26970.2	26727.2
Annual Energy Electricity [kWh/yr]	27114.7	27085.2	27116	27021.3	27085.2	26902.4	26994.6	27116.7	26966.8	27085.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,773.42	$ 3,769.24	$ 3,773.6	$ 3,760.2	$ 3,769.24	$ 3,743.37	$ 3,756.42	$ 3,773.7	$ 3,752.49	$ 3,769.24
Annual Energy Natural Gas [m3/yr]	382.7	663.5	350.4	382.7	625.6	663.6	663.6	329.4	663.3	601
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 286.21	$ 151.15	$ 165.08	$ 269.86	$ 286.25	$ 286.25	$ 142.09	$ 286.12	$ 259.25
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17869	17848	17870	18139	17849	17866	18118	17871	21232	17850
Upgrade Package List	Pkg2221101033	Pkg2221101032	Pkg2221101033	Pkg2221102033	Pkg2221101032	Pkg2221101033	Pkg2221102032	Pkg2221101033	Pkg2231102031	Pkg2221101032
GHGI [kg/m2]	2.02	3.07	1.9	2.02	2.93	3.07	3.07	1.82	3.07	2.83
% ICC	2.6%	2.5%	2.7%	2.7%	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92.5	92	92.5	92	92	91.1	91.5	92.5	92.4	92
Output: MEUI [kWh/(m2 * yr)]	46.4	52.1	45.8	46.3	51.3	51.7	51.9	45.4	51.8	50.8
Output: Better than ERS (%)	33710.0%	37730.0%	33240.0%	33550.0%	37190.0%	37500.0%	37620.0%	32930.0%	37580.0%	36840.0%
Output: Better than Envelope (%)	2020.0%	2060.0%	2020.0%	2060.0%	2060.0%	2140.0%	2100.0%	2020.0%	2030.0%	2060.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18283	18254	18284	18190	18254	18071	18163	18285	18135	18254
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,577.92	$ 2,573.76	$ 2,578.1	$ 2,564.75	$ 2,573.76	$ 2,547.98	$ 2,560.98	$ 2,578.2	$ 2,557.06	$ 2,573.76
Annual savings in carbon tax for electricity [$/year]	$ 9.14	$ 9.13	$ 9.14	$ 9.09	$ 9.13	$ 9.04	$ 9.08	$ 9.14	$ 9.07	$ 9.13
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,587.06	$ 2,582.88	$ 2,587.24	$ 2,573.84	$ 2,582.88	$ 2,557.02	$ 2,570.06	$ 2,587.34	$ 2,566.13	$ 2,582.88
Annual savings in GHG from electricity savings [kg CO2e/year]	201.1	200.8	201.1	200.1	200.8	198.8	199.8	201.1	199.5	200.8
Annual savings in natural gas [m3/year]	291.37	280.91	292.58	291.37	282.32	280.91	280.91	293.36	280.92	283.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,699.56	$ 2,602.63	$ 2,710.71	$ 2,699.56	$ 2,615.71	$ 2,602.6	$ 2,602.6	$ 2,717.96	$ 2,602.7	$ 2,624.21
Annual savings in carbon tax for natural gas [$/year]	$ 673.8	$ 649.6	$ 676.58	$ 673.8	$ 652.87	$ 649.6	$ 649.6	$ 678.39	$ 649.62	$ 654.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,373.36	$ 3,252.23	$ 3,387.29	$ 3,373.36	$ 3,268.58	$ 3,252.19	$ 3,252.19	$ 3,396.35	$ 3,252.32	$ 3,279.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	14973.3	14435.6	15035.1	14973.3	14508.2	14435.5	14435.5	15075.3	14436	14555.3
Net Present Value [$]	$ 11,302.	$ 12,538.01	$ 11,584.73	$ 11,523.03	$ 12,770.63	$ 12,508.03	$ 12,766.9	$ 11,710.64	$ 12,829.44	$ 12,864.38
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$.	$.	$ 850.	$.	$ 850.

LARGE 50SAR Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 29,736.79	$ 30,198.29	$ 30,286.79	$ 30,586.79	$ 30,748.29	$ 31,048.29	$ 31,233.33	$ 30,793.33	$ 31,694.83	$ 31,254.83
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 33,483.63	$ 34,003.27	$ 34,102.93	$ 34,440.73	$ 34,622.57	$ 34,960.37	$ 35,168.73	$ 34,673.29	$ 35,688.38	$ 35,192.94
Net Present Value [$]	$ 11,302.	$ 11,523.03	$ 11,584.73	$ 11,710.64	$ 11,805.77	$ 11,931.68	$ 12,176.84	$ 12,205.35	$ 12,384.36	$ 12,428.21
Incremental dollars per GHG saving	$ 2.01	$ 2.04	$ 2.04	$ 2.06	$ 2.07	$ 2.09	$ 2.11	$ 2.08	$ 2.15	$ 2.12
Auxiliary Energy Required Heating [GJ/yr]	170.2	169.2	170.2	170.2	169.2	169.2	167.8	169.6	166.8	168.6
Annual Energy DHW [GJ/yr]	14.3	14.3	13	12.3	13	12.3	14.3	14.3	14.3	14.3
Annual Energy Space Heating [GJ/yr]	65.4	65.1	65.4	65.5	65.1	65.1	64.6	65.2	64.2	64.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	111.9	111.5	110.7	109.9	110.3	109.6	111	111.7	110.6	111.3
Design Heating Load [W]	26262.1	26074.2	26262.1	26262.1	26074.2	26074.2	26002	26177.9	25814.2	25990
Annual Energy Electricity [kWh/yr]	27114.7	27021.3	27116	27116.7	27022.6	27023.3	26873.2	27055.2	26774.6	26962.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 3,773.42	$ 3,760.2	$ 3,773.6	$ 3,773.7	$ 3,760.38	$ 3,760.48	$ 3,739.24	$ 3,765.	$ 3,725.29	$ 3,751.88
Annual Energy Natural Gas [m3/yr]	382.7	382.7	350.4	329.4	350.4	329.4	382.7	382.7	382.7	382.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 165.08	$ 165.08	$ 151.15	$ 142.09	$ 151.15	$ 142.09	$ 165.08	$ 165.08	$ 165.08	$ 165.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17869	18139	17870	17871	18140	18141	21001	20983	21271	21253
Upgrade Package List	Pkg2221101033	Pkg2221102033	Pkg2221101033	Pkg2221101033	Pkg2221102033	Pkg2221102033	Pkg2231101033	Pkg2231101032	Pkg2231102033	Pkg2231102032
GHGI [kg/m2]	2.02	2.02	1.9	1.82	1.89	1.82	2.01	2.02	2.01	2.01
% ICC	2.6%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%	2.7%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92.5	92	92.5	92.5	92	92	91.2	92.2	90.7	91.7
Output: MEUI [kWh/(m2 * yr)]	46.4	46.3	45.8	45.4	45.6	45.2	46	46.3	45.8	46.1
Output: Better than ERS (%)	33710.0%	33550.0%	33240.0%	32930.0%	33090.0%	32810.0%	33360.0%	33630.0%	33200.0%	33480.0%
Output: Better than Envelope (%)	2020.0%	2060.0%	2020.0%	2020.0%	2060.0%	2060.0%	2130.0%	2050.0%	2180.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	18283	18190	18284	18285	18191	18192	18042	18224	17943	18131
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,577.92	$ 2,564.75	$ 2,578.1	$ 2,578.2	$ 2,564.93	$ 2,565.03	$ 2,543.87	$ 2,569.53	$ 2,529.96	$ 2,556.46
Annual savings in carbon tax for electricity [$/year]	$ 9.14	$ 9.09	$ 9.14	$ 9.14	$ 9.1	$ 9.1	$ 9.02	$ 9.11	$ 8.97	$ 9.07
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,587.06	$ 2,573.84	$ 2,587.24	$ 2,587.34	$ 2,574.03	$ 2,574.13	$ 2,552.89	$ 2,578.64	$ 2,538.93	$ 2,565.52
Annual savings in GHG from electricity savings [kg CO2e/year]	201.1	200.1	201.1	201.1	200.1	200.1	198.5	200.5	197.4	199.4
Annual savings in natural gas [m3/year]	291.37	291.37	292.58	293.36	292.58	293.36	291.37	291.37	291.37	291.37
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,699.56	$ 2,699.56	$ 2,710.71	$ 2,717.96	$ 2,710.71	$ 2,717.96	$ 2,699.56	$ 2,699.56	$ 2,699.56	$ 2,699.56
Annual savings in carbon tax for natural gas [$/year]	$ 673.8	$ 673.8	$ 676.58	$ 678.39	$ 676.58	$ 678.39	$ 673.8	$ 673.8	$ 673.8	$ 673.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,373.36	$ 3,373.36	$ 3,387.29	$ 3,396.35	$ 3,387.29	$ 3,396.35	$ 3,373.36	$ 3,373.36	$ 3,373.36	$ 3,373.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	14973.3	14973.3	15035.1	15075.3	15035.1	15075.3	14973.3	14973.3	14973.3	14973.3
Net Present Value [$]	$ 11,302.	$ 11,523.03	$ 11,584.73	$ 11,710.64	$ 11,805.77	$ 11,931.68	$ 12,176.84	$ 12,205.35	$ 12,384.36	$ 12,428.21
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.	$.	$.	$.

LARGE 50SAR Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 22,275.91	$ 22,737.41	$ 22,784.23	$ 22,825.91	$ 22,875.91	$ 23,125.91	$ 23,135.91	$ 23,245.73	$ 23,272.45	$ 23,287.41
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,458.42	$ 34,151.59	$ 34,221.91	$ 34,284.52	$ 34,359.62	$ 34,735.12	$ 34,750.14	$ 34,915.09	$ 34,955.22	$ 34,977.69
Net Present Value [$]	$ 21,888.04	$ 21,973.47	$ 24,998.87	$ 22,057.09	$ 20,384.79	$ 22,104.98	$ 27,088.02	$ 25,071.29	$ 27,241.97	$ 22,142.28
Incremental dollars per GHG saving	$ 1.2	$ 1.23	$ 1.23	$ 1.23	$ 1.2	$ 1.24	$ 1.25	$ 1.26	$ 1.26	$ 1.25
Auxiliary Energy Required Heating [GJ/yr]	255	253.7	265.8	255	257.2	255	264.6	264.5	266.3	253.7
Annual Energy DHW [GJ/yr]	26.7	26.7	26.7	25	15.8	23.9	26.7	26.7	26.7	25
Annual Energy Space Heating [GJ/yr]	119.8	119.3	124.2	119.8	120.3	119.8	125.2	123.6	125.9	119.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1	1.1
Total Energy [GJ/yr]	175.1	174.6	178.7	173.4	164.7	172.3	181.2	178.2	181.2	172.9
Design Heating Load [W]	35843.1	35620	35843.1	35843.1	35434.8	35843.1	37722.9	35620	38239.5	35620
Annual Energy Electricity [kWh/yr]	41224.1	41077.6	42235.9	41224.1	41361	41224.1	42908.8	42084.8	42916.9	41077.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,769.9	$ 5,749.17	$ 5,913.06	$ 5,769.9	$ 5,789.27	$ 5,769.9	$ 6,008.28	$ 5,891.68	$ 6,009.43	$ 5,749.17
Annual Energy Natural Gas [m3/yr]	717.1	717.2	716.8	671.6	423.9	641.5	717.4	716.8	717	671.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.33	$ 309.38	$ 309.2	$ 289.7	$ 182.86	$ 276.72	$ 309.46	$ 309.2	$ 309.29	$ 289.75
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11458	11728	11404	11459	11461	11460	1756	11674	3358	11729
Upgrade Package List	Pkg2121101031	Pkg2121102031	Pkg2121101021	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg1121101032	Pkg2121102021	Pkg1131101031	Pkg2121102031
GHGI [kg/m2]	3.57	3.57	3.6	3.4	2.48	3.29	3.61	3.59	3.61	3.4
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	138.6	137.9	144.5	138.6	139.8	138.6	143.8	143.8	144.8	137.9
Output: MEUI [kWh/(m2 * yr)]	81.1	80.8	83.1	80.2	75.4	79.6	84.4	82.8	84.4	79.9
Output: Better than ERS (%)	58400.0%	58200.0%	59800.0%	57730.0%	54340.0%	57300.0%	60780.0%	59610.0%	60780.0%	57540.0%
Output: Better than Envelope (%)	1380.0%	1430.0%	1020.0%	1380.0%	1310.0%	1380.0%	1060.0%	1060.0%	1000.0%	1430.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31946	31800	32958	31946	32083	31946	33631	32807	33639	31800
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,504.41	$ 4,483.76	$ 4,647.08	$ 4,504.41	$ 4,523.72	$ 4,504.41	$ 4,741.96	$ 4,625.77	$ 4,743.1	$ 4,483.76
Annual savings in carbon tax for electricity [$/year]	$ 15.97	$ 15.9	$ 16.48	$ 15.97	$ 16.04	$ 15.97	$ 16.82	$ 16.4	$ 16.82	$ 15.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,520.39	$ 4,499.66	$ 4,663.56	$ 4,520.39	$ 4,539.76	$ 4,520.39	$ 4,758.77	$ 4,642.18	$ 4,759.92	$ 4,499.66
Annual savings in GHG from electricity savings [kg CO2e/year]	351.4	349.8	362.5	351.4	352.9	351.4	369.9	360.9	370	349.8
Annual savings in natural gas [m3/year]	367.56	367.56	367.57	369.25	378.48	370.38	367.55	367.57	367.56	369.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,405.44	$ 3,405.4	$ 3,405.54	$ 3,421.14	$ 3,506.65	$ 3,431.53	$ 3,405.33	$ 3,405.54	$ 3,405.47	$ 3,421.11
Annual savings in carbon tax for natural gas [$/year]	$ 849.98	$ 849.97	$ 850.01	$ 853.9	$ 875.24	$ 856.49	$ 849.95	$ 850.01	$ 849.99	$ 853.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,255.42	$ 4,255.37	$ 4,255.55	$ 4,275.04	$ 4,381.89	$ 4,288.03	$ 4,255.29	$ 4,255.55	$ 4,255.46	$ 4,275.
Annual savings in GHG from natural gas savings [kg CO2e/year]	18888.5	18888.3	18889	18975.6	19449.8	19033.2	18887.9	18889	18888.7	18975.4
Net Present Value [$]	$ 21,888.04	$ 21,973.47	$ 24,998.87	$ 22,057.09	$ 20,384.79	$ 22,104.98	$ 27,088.02	$ 25,071.29	$ 27,241.97	$ 22,142.28
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	8.77	8.77	10.47	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,760.96	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,760.96	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$.	$.	$ 550.

LARGE 50SAR Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 23,649.91	$ 22,875.91	$ 22,275.91	$ 24,111.41	$ 24,199.91	$ 23,337.41	$ 23,425.91	$ 22,737.41	$ 22,825.91	$ 22,784.23
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 35,522.16	$ 34,359.62	$ 33,458.42	$ 36,215.34	$ 36,348.26	$ 35,052.79	$ 35,185.72	$ 34,151.59	$ 34,284.52	$ 34,221.91
Net Present Value [$]	$ 26,034.09	$ 20,384.79	$ 21,888.04	$ 26,124.21	$ 25,937.37	$ 20,482.03	$ 20,614.27	$ 21,973.47	$ 22,057.09	$ 24,998.87
Incremental dollars per GHG saving	$ 1.19	$ 1.2	$ 1.2	$ 1.21	$ 1.22	$ 1.22	$ 1.22	$ 1.23	$ 1.23	$ 1.23
Auxiliary Energy Required Heating [GJ/yr]	263.6	257.2	255	262.3	263.2	255.9	257.2	253.7	255	265.8
Annual Energy DHW [GJ/yr]	9.1	15.8	26.7	9.1	8.3	15.8	14.3	26.7	25	26.7
Annual Energy Space Heating [GJ/yr]	123	120.3	119.8	122.5	122.9	119.8	120.3	119.3	119.8	124.2
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Energy [GJ/yr]	160.7	164.7	175.1	160.2	159.8	164.2	163.2	174.6	173.4	178.7
Design Heating Load [W]	35843.1	35434.8	35843.1	35620	35843.1	35211.7	35434.8	35620	35843.1	35843.1
Annual Energy Electricity [kWh/yr]	44633.9	41361	41224.1	44489.7	44382.7	41219.5	41362.7	41077.6	41224.1	42235.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,252.38	$ 5,789.27	$ 5,769.9	$ 6,231.98	$ 6,216.84	$ 5,769.24	$ 5,789.51	$ 5,749.17	$ 5,769.9	$ 5,913.06
Annual Energy Natural Gas [m3/yr]	0	423.9	717.1	0	0	423.9	385.1	717.2	671.6	716.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$ 182.86	$ 309.33	$.	$.	$ 182.86	$ 166.12	$ 309.38	$ 289.7	$ 309.2
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	11464	11461	11458	11734	11465	11731	11462	11728	11459	11404
Upgrade Package List	Pkg2121101031	Pkg2121101031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121102031	Pkg2121101031	Pkg2121101021
GHGI [kg/m2]	0.96	2.48	3.57	0.96	0.96	2.48	2.33	3.57	3.4	3.6
% ICC	2.1%	2.0%	2.0%	2.1%	2.1%	2.1%	2.1%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	143.3	139.8	138.6	142.6	143.1	139.1	139.8	137.9	138.6	144.5
Output: MEUI [kWh/(m2 * yr)]	73.2	75.4	81.1	73	72.8	75.1	74.6	80.8	80.2	83.1
Output: Better than ERS (%)	52770.0%	54340.0%	58400.0%	52580.0%	52420.0%	54140.0%	53750.0%	58200.0%	57730.0%	59800.0%
Output: Better than Envelope (%)	1090.0%	1310.0%	1380.0%	1140.0%	1110.0%	1350.0%	1310.0%	1430.0%	1380.0%	1020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	35356	32083	31946	35212	35105	31942	32085	31800	31946	32958
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,985.2	$ 4,523.72	$ 4,504.41	$ 4,964.86	$ 4,949.78	$ 4,503.77	$ 4,523.96	$ 4,483.76	$ 4,504.41	$ 4,647.08
Annual savings in carbon tax for electricity [$/year]	$ 17.68	$ 16.04	$ 15.97	$ 17.61	$ 17.55	$ 15.97	$ 16.04	$ 15.9	$ 15.97	$ 16.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,002.87	$ 4,539.76	$ 4,520.39	$ 4,982.47	$ 4,967.33	$ 4,519.74	$ 4,540.	$ 4,499.66	$ 4,520.39	$ 4,663.56
Annual savings in GHG from electricity savings [kg CO2e/year]	388.9	352.9	351.4	387.3	386.2	351.4	352.9	349.8	351.4	362.5
Annual savings in natural gas [m3/year]	394.28	378.48	367.56	394.28	394.28	378.48	379.93	367.56	369.25	367.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,652.98	$ 3,506.65	$ 3,405.44	$ 3,652.98	$ 3,652.98	$ 3,506.65	$ 3,520.04	$ 3,405.4	$ 3,421.14	$ 3,405.54
Annual savings in carbon tax for natural gas [$/year]	$ 911.77	$ 875.24	$ 849.98	$ 911.77	$ 911.77	$ 875.24	$ 878.59	$ 849.97	$ 853.9	$ 850.01
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,564.75	$ 4,381.89	$ 4,255.42	$ 4,564.75	$ 4,564.75	$ 4,381.89	$ 4,398.63	$ 4,255.37	$ 4,275.04	$ 4,255.55
Annual savings in GHG from natural gas savings [kg CO2e/year]	20261.5	19449.8	18888.5	20261.5	20261.5	19449.8	19524.1	18888.3	18975.6	18889
Net Present Value [$]	$ 26,034.09	$ 20,384.79	$ 21,888.04	$ 26,124.21	$ 25,937.37	$ 20,482.03	$ 20,614.27	$ 21,973.47	$ 22,057.09	$ 24,998.87
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	10.47	8.77	10.47	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,760.96
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 600.	$.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 550.	$.

LARGE 50SAR Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,336.79	$ 27,798.29	$ 22,875.91	$ 23,337.41	$ 24,675.91	$ 23,425.91	$ 25,137.41	$ 23,725.91	$ 23,887.41	$ 25,225.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,059.86	$ 41,753.03	$ 34,359.62	$ 35,052.79	$ 37,063.22	$ 35,185.72	$ 37,756.39	$ 35,636.32	$ 35,878.89	$ 37,889.32
Net Present Value [$]	$ 19,763.71	$ 19,854.2	$ 20,384.79	$ 20,482.03	$ 20,527.29	$ 20,614.27	$ 20,625.81	$ 20,701.91	$ 20,711.7	$ 20,756.76
Incremental dollars per GHG saving	$ 1.47	$ 1.5	$ 1.2	$ 1.22	$ 1.29	$ 1.22	$ 1.32	$ 1.23	$ 1.25	$ 1.32
Auxiliary Energy Required Heating [GJ/yr]	233.4	232.1	257.2	255.9	250.3	257.2	249	257.2	255.9	250.3
Annual Energy DHW [GJ/yr]	26.7	26.7	15.8	15.8	15.8	14.3	15.8	13.4	14.3	14.3
Annual Energy Space Heating [GJ/yr]	109.8	109.3	120.3	119.8	117.3	120.3	116.8	120.3	119.8	117.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.8	1.1	1.8	1.1	1.1	1.8
Total Energy [GJ/yr]	165.1	164.5	164.7	164.2	162.4	163.2	161.9	162.3	162.7	160.9
Design Heating Load [W]	33310.9	33087.9	35434.8	35211.7	34405.4	35434.8	34182.4	35434.8	35211.7	34405.4
Annual Energy Electricity [kWh/yr]	38432.7	38288.3	41361	41219.5	40717.2	41362.7	40576.2	41363.9	41221.3	40718.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,374.91	$ 5,354.48	$ 5,789.27	$ 5,769.24	$ 5,698.17	$ 5,789.51	$ 5,678.22	$ 5,789.68	$ 5,769.5	$ 5,698.41
Annual Energy Natural Gas [m3/yr]	717.2	717.3	423.9	423.9	423.9	385.1	423.9	359.4	385.1	385.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 309.38	$ 309.42	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 155.03	$ 166.12	$ 166.12
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17830	18100	11461	11731	11497	11462	11767	11463	11732	11498
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2121101031	Pkg2121102031	Pkg2121101033	Pkg2121101031	Pkg2121102033	Pkg2121101031	Pkg2121102031	Pkg2121101033
GHGI [kg/m2]	3.51	3.51	2.48	2.48	2.46	2.33	2.46	2.24	2.33	2.32
% ICC	2.4%	2.5%	2.0%	2.1%	2.2%	2.1%	2.2%	2.1%	2.1%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	126.9	126.2	139.8	139.1	136.1	139.8	135.3	139.8	139.1	136.1
Output: MEUI [kWh/(m2 * yr)]	75.6	75.3	75.4	75.1	74.2	74.6	73.9	74.1	74.4	73.4
Output: Better than ERS (%)	54490.0%	54260.0%	54340.0%	54140.0%	53440.0%	53750.0%	53240.0%	53400.0%	53550.0%	52850.0%
Output: Better than Envelope (%)	2110.0%	2160.0%	1310.0%	1350.0%	1540.0%	1310.0%	1580.0%	1310.0%	1350.0%	1540.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	29155	29010	32083	31942	31439	32085	31298	32086	31943	31441
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,110.83	$ 4,090.47	$ 4,523.72	$ 4,503.77	$ 4,432.94	$ 4,523.96	$ 4,413.06	$ 4,524.13	$ 4,504.02	$ 4,433.18
Annual savings in carbon tax for electricity [$/year]	$ 14.58	$ 14.51	$ 16.04	$ 15.97	$ 15.72	$ 16.04	$ 15.65	$ 16.04	$ 15.97	$ 15.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,125.4	$ 4,104.97	$ 4,539.76	$ 4,519.74	$ 4,448.66	$ 4,540.	$ 4,428.71	$ 4,540.17	$ 4,519.99	$ 4,448.9
Annual savings in GHG from electricity savings [kg CO2e/year]	320.7	319.1	352.9	351.4	345.8	352.9	344.3	352.9	351.4	345.9
Annual savings in natural gas [m3/year]	367.56	367.55	378.48	378.48	378.48	379.93	378.48	380.89	379.93	379.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,405.4	$ 3,405.37	$ 3,506.65	$ 3,506.65	$ 3,506.65	$ 3,520.04	$ 3,506.65	$ 3,528.92	$ 3,520.04	$ 3,520.04
Annual savings in carbon tax for natural gas [$/year]	$ 849.97	$ 849.96	$ 875.24	$ 875.24	$ 875.24	$ 878.59	$ 875.24	$ 880.8	$ 878.59	$ 878.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,255.37	$ 4,255.33	$ 4,381.89	$ 4,381.89	$ 4,381.89	$ 4,398.63	$ 4,381.89	$ 4,409.72	$ 4,398.63	$ 4,398.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	18888.3	18888.1	19449.8	19449.8	19449.8	19524.1	19449.8	19573.3	19524.1	19524.1
Net Present Value [$]	$ 19,763.71	$ 19,854.2	$ 20,384.79	$ 20,482.03	$ 20,527.29	$ 20,614.27	$ 20,625.81	$ 20,701.91	$ 20,711.7	$ 20,756.76
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95	$ 10,894.95
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 75	NA	HRV sre 75	NA	NA	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.

LARGE 50SAR Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 27,886.79	$ 27,936.79	$ 28,186.79	$ 28,348.29	$ 28,398.29	$ 28,486.79	$ 28,648.29	$ 28,696.79	$ 28,786.79	$ 28,833.33
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,885.96	$ 41,961.06	$ 42,336.56	$ 42,579.13	$ 42,654.23	$ 42,787.16	$ 43,029.73	$ 43,102.58	$ 43,237.76	$ 43,307.66
Net Present Value [$]	$ 19,932.51	$ 18,257.3	$ 19,980.4	$ 20,023.24	$ 18,343.95	$ 18,486.78	$ 20,070.16	$ 20,161.18	$ 18,574.05	$ 20,293.9
Incremental dollars per GHG saving	$ 1.5	$ 1.46	$ 1.51	$ 1.52	$ 1.49	$ 1.48	$ 1.53	$ 1.55	$ 1.5	$ 1.55
Auxiliary Energy Required Heating [GJ/yr]	233.4	235.6	233.4	232.1	234.3	235.6	232.1	228.7	235.6	230.3
Annual Energy DHW [GJ/yr]	25	15.8	23.9	25	15.8	14.3	23.9	26.7	13.4	26.7
Annual Energy Space Heating [GJ/yr]	109.8	110.3	109.8	109.3	109.8	110.3	109.3	107.8	110.3	108.4
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8	1.1	1.1
Total Energy [GJ/yr]	163.4	154.6	162.3	162.9	154.1	153.2	161.7	163.7	152.2	163.7
Design Heating Load [W]	33310.9	32902.6	33310.9	33087.9	32679.6	32902.6	33087.9	32490.4	32902.6	33007.1
Annual Energy Electricity [kWh/yr]	38432.7	38568.8	38432.7	38288.3	38423.2	38570.5	38288.3	38058.2	38571.6	38058.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,374.91	$ 5,394.17	$ 5,374.91	$ 5,354.48	$ 5,373.57	$ 5,394.41	$ 5,354.48	$ 5,321.92	$ 5,394.57	$ 5,321.95
Annual Energy Natural Gas [m3/yr]	671.7	423.9	641.6	671.8	423.9	385.1	641.6	717.4	359.4	716.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 289.75	$ 182.86	$ 276.76	$ 289.79	$ 182.86	$ 166.12	$ 276.76	$ 309.46	$ 155.03	$ 309.25
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17831	17833	17832	18101	18103	17834	18102	17848	17835	20962
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2221102031	Pkg2221101032	Pkg2221101031	Pkg2231101031
GHGI [kg/m2]	3.34	2.42	3.23	3.34	2.42	2.27	3.23	3.51	2.18	3.51
% ICC	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	126.9	128	126.9	126.2	127.3	128.1	126.2	124.3	128.1	125.2
Output: MEUI [kWh/(m2 * yr)]	74.7	70	74.1	74.4	69.7	69.2	73.8	74.9	68.7	74.9
Output: Better than ERS (%)	53830.0%	50390.0%	53400.0%	53630.0%	50200.0%	49840.0%	53160.0%	53950.0%	49450.0%	53950.0%
Output: Better than Envelope (%)	2110.0%	2040.0%	2110.0%	2160.0%	2080.0%	2040.0%	2160.0%	2270.0%	2040.0%	2220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	29155	29291	29155	29010	29145	29293	29010	28780	29294	28780
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,110.83	$ 4,130.02	$ 4,110.83	$ 4,090.47	$ 4,109.49	$ 4,130.26	$ 4,090.47	$ 4,058.02	$ 4,130.41	$ 4,058.05
Annual savings in carbon tax for electricity [$/year]	$ 14.58	$ 14.65	$ 14.58	$ 14.51	$ 14.57	$ 14.65	$ 14.51	$ 14.39	$ 14.65	$ 14.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,125.4	$ 4,144.66	$ 4,125.4	$ 4,104.97	$ 4,124.06	$ 4,144.9	$ 4,104.97	$ 4,072.41	$ 4,145.06	$ 4,072.44
Annual savings in GHG from electricity savings [kg CO2e/year]	320.7	322.2	320.7	319.1	320.6	322.2	319.1	316.6	322.2	316.6
Annual savings in natural gas [m3/year]	369.25	378.48	370.37	369.25	378.48	379.93	370.37	367.55	380.89	367.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,421.11	$ 3,506.65	$ 3,431.5	$ 3,421.07	$ 3,506.65	$ 3,520.04	$ 3,431.5	$ 3,405.33	$ 3,528.92	$ 3,405.51
Annual savings in carbon tax for natural gas [$/year]	$ 853.89	$ 875.24	$ 856.49	$ 853.88	$ 875.24	$ 878.59	$ 856.49	$ 849.95	$ 880.8	$ 850.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,275.	$ 4,381.89	$ 4,287.99	$ 4,274.96	$ 4,381.89	$ 4,398.63	$ 4,287.99	$ 4,255.29	$ 4,409.72	$ 4,255.5
Annual savings in GHG from natural gas savings [kg CO2e/year]	18975.4	19449.8	19033	18975.2	19449.8	19524.1	19033	18887.9	19573.3	18888.8
Net Present Value [$]	$ 19,932.51	$ 18,257.3	$ 19,980.4	$ 20,023.24	$ 18,343.95	$ 18,486.78	$ 20,070.16	$ 20,161.18	$ 18,574.05	$ 20,293.9
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	10.47	8.77	10.47	8.77	8.77	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.	$.

LARGE 50SAR Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,936.79	$ 28,486.79	$ 28,398.29	$ 28,786.79	$ 27,886.79	$ 28,186.79	$ 28,948.29	$ 29,248.29	$ 28,348.29	$ 29,296.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,961.06	$ 42,787.16	$ 42,654.23	$ 43,237.76	$ 41,885.96	$ 42,336.56	$ 43,480.33	$ 43,930.93	$ 42,579.13	$ 44,003.78
Net Present Value [$]	$ 18,257.3	$ 18,486.78	$ 18,343.95	$ 18,574.05	$ 19,932.51	$ 19,980.4	$ 18,573.43	$ 18,660.7	$ 20,023.24	$ 18,667.31
Incremental dollars per GHG saving	$ 1.46	$ 1.48	$ 1.49	$ 1.5	$ 1.5	$ 1.51	$ 1.51	$ 1.52	$ 1.52	$ 1.53
Auxiliary Energy Required Heating [GJ/yr]	235.6	235.6	234.3	235.6	233.4	233.4	234.3	234.3	232.1	230.9
Annual Energy DHW [GJ/yr]	15.8	14.3	15.8	13.4	25	23.9	14.3	13.4	25	15.8
Annual Energy Space Heating [GJ/yr]	110.3	110.3	109.8	110.3	109.8	109.8	109.8	109.8	109.3	108.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.8
Total Energy [GJ/yr]	154.6	153.2	154.1	152.2	163.4	162.3	152.7	151.7	162.9	153.3
Design Heating Load [W]	32902.6	32902.6	32679.6	32902.6	33310.9	33310.9	32679.6	32679.6	33087.9	32082.1
Annual Energy Electricity [kWh/yr]	38568.8	38570.5	38423.2	38571.6	38432.7	38432.7	38424.9	38426	38288.3	38199.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,394.17	$ 5,394.41	$ 5,373.57	$ 5,394.57	$ 5,374.91	$ 5,374.91	$ 5,373.81	$ 5,373.96	$ 5,354.48	$ 5,341.96
Annual Energy Natural Gas [m3/yr]	423.9	385.1	423.9	359.4	671.7	641.6	385.1	359.4	671.8	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 166.12	$ 182.86	$ 155.03	$ 289.75	$ 276.76	$ 166.12	$ 155.03	$ 289.79	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	17834	18103	17835	17831	17832	18104	18105	18101	17851
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221102031	Pkg2221101032
GHGI [kg/m2]	2.42	2.27	2.42	2.18	3.34	3.23	2.27	2.17	3.34	2.41
% ICC	2.5%	2.5%	2.5%	2.6%	2.5%	2.5%	2.6%	2.6%	2.5%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	128	128.1	127.3	128.1	126.9	126.9	127.4	127.4	126.2	125.5
Output: MEUI [kWh/(m2 * yr)]	70	69.2	69.7	68.7	74.7	74.1	68.9	68.4	74.4	69.2
Output: Better than ERS (%)	50390.0%	49840.0%	50200.0%	49450.0%	53830.0%	53400.0%	49650.0%	49260.0%	53630.0%	49880.0%
Output: Better than Envelope (%)	2040.0%	2040.0%	2080.0%	2040.0%	2110.0%	2110.0%	2080.0%	2080.0%	2160.0%	2200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	29291	29293	29145	29294	29155	29155	29147	29148	29010	28922
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,130.02	$ 4,130.26	$ 4,109.49	$ 4,130.41	$ 4,110.83	$ 4,110.83	$ 4,109.73	$ 4,109.88	$ 4,090.47	$ 4,077.99
Annual savings in carbon tax for electricity [$/year]	$ 14.65	$ 14.65	$ 14.57	$ 14.65	$ 14.58	$ 14.58	$ 14.57	$ 14.57	$ 14.51	$ 14.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,144.66	$ 4,144.9	$ 4,124.06	$ 4,145.06	$ 4,125.4	$ 4,125.4	$ 4,124.3	$ 4,124.46	$ 4,104.97	$ 4,092.45
Annual savings in GHG from electricity savings [kg CO2e/year]	322.2	322.2	320.6	322.2	320.7	320.7	320.6	320.6	319.1	318.1
Annual savings in natural gas [m3/year]	378.48	379.93	378.48	380.89	369.25	370.37	379.93	380.89	369.25	378.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,506.65	$ 3,520.04	$ 3,506.65	$ 3,528.92	$ 3,421.11	$ 3,431.5	$ 3,520.04	$ 3,528.92	$ 3,421.07	$ 3,506.65
Annual savings in carbon tax for natural gas [$/year]	$ 875.24	$ 878.59	$ 875.24	$ 880.8	$ 853.89	$ 856.49	$ 878.59	$ 880.8	$ 853.88	$ 875.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,381.89	$ 4,398.63	$ 4,381.89	$ 4,409.72	$ 4,275.	$ 4,287.99	$ 4,398.63	$ 4,409.72	$ 4,274.96	$ 4,381.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	19449.8	19524.1	19449.8	19573.3	18975.4	19033	19524.1	19573.3	18975.2	19449.8
Net Present Value [$]	$ 18,257.3	$ 18,486.78	$ 18,343.95	$ 18,574.05	$ 19,932.51	$ 19,980.4	$ 18,573.43	$ 18,660.7	$ 20,023.24	$ 18,667.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	8.77	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$ 850.	$ 550.	$ 850.	$ 550.	$ 850.	$ 550.	$.

LARGE 50SAR Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,936.79	$ 28,398.29	$ 29,736.79	$ 28,486.79	$ 30,198.29	$ 28,948.29	$ 28,786.79	$ 30,286.79	$ 29,248.29	$ 29,296.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,961.06	$ 42,654.23	$ 44,664.66	$ 42,787.16	$ 45,357.83	$ 43,480.33	$ 43,237.76	$ 45,490.76	$ 43,930.93	$ 44,003.78
Net Present Value [$]	$ 18,257.3	$ 18,343.95	$ 18,414.95	$ 18,486.78	$ 18,492.84	$ 18,573.43	$ 18,574.05	$ 18,644.43	$ 18,660.7	$ 18,667.31
Incremental dollars per GHG saving	$ 1.46	$ 1.49	$ 1.55	$ 1.48	$ 1.58	$ 1.51	$ 1.5	$ 1.58	$ 1.52	$ 1.53
Auxiliary Energy Required Heating [GJ/yr]	235.6	234.3	228.7	235.6	227.4	234.3	235.6	228.7	234.3	230.9
Annual Energy DHW [GJ/yr]	15.8	15.8	15.8	14.3	15.8	14.3	13.4	14.3	13.4	15.8
Annual Energy Space Heating [GJ/yr]	110.3	109.8	107.3	110.3	106.8	109.8	110.3	107.3	109.8	108.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.1	1.1	1.8	1.1	1.8	1.1	1.1	1.8	1.1	1.8
Total Energy [GJ/yr]	154.6	154.1	152.3	153.2	151.8	152.7	152.2	150.9	151.7	153.3
Design Heating Load [W]	32902.6	32679.6	31873.3	32902.6	31650.2	32679.6	32902.6	31873.3	32679.6	32082.1
Annual Energy Electricity [kWh/yr]	38568.8	38423.2	37930.9	38570.5	37781.9	38424.9	38571.6	37932.6	38426	38199.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,394.17	$ 5,373.57	$ 5,303.91	$ 5,394.41	$ 5,282.82	$ 5,373.81	$ 5,394.57	$ 5,304.15	$ 5,373.96	$ 5,341.96
Annual Energy Natural Gas [m3/yr]	423.9	423.9	423.9	385.1	423.9	385.1	359.4	385.1	359.4	423.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 182.86	$ 182.86	$ 182.86	$ 166.12	$ 182.86	$ 166.12	$ 155.03	$ 166.12	$ 155.03	$ 182.86
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	17833	18103	17869	17834	18139	18104	17835	17870	18105	17851
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101033	Pkg2221101031	Pkg2221102033	Pkg2221102031	Pkg2221101031	Pkg2221101033	Pkg2221102031	Pkg2221101032
GHGI [kg/m2]	2.42	2.42	2.4	2.27	2.4	2.27	2.18	2.26	2.17	2.41
% ICC	2.5%	2.5%	2.6%	2.5%	2.7%	2.6%	2.6%	2.7%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	128	127.3	124.3	128.1	123.6	127.4	128.1	124.3	127.4	125.5
Output: MEUI [kWh/(m2 * yr)]	70	69.7	68.7	69.2	68.4	68.9	68.7	67.9	68.4	69.2
Output: Better than ERS (%)	50390.0%	50200.0%	49490.0%	49840.0%	49300.0%	49650.0%	49450.0%	48950.0%	49260.0%	49880.0%
Output: Better than Envelope (%)	2040.0%	2080.0%	2270.0%	2040.0%	2310.0%	2080.0%	2040.0%	2270.0%	2080.0%	2200.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	29291	29145	28653	29293	28504	29147	29294	28655	29148	28922
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,130.02	$ 4,109.49	$ 4,040.07	$ 4,130.26	$ 4,019.06	$ 4,109.73	$ 4,130.41	$ 4,040.31	$ 4,109.88	$ 4,077.99
Annual savings in carbon tax for electricity [$/year]	$ 14.65	$ 14.57	$ 14.33	$ 14.65	$ 14.25	$ 14.57	$ 14.65	$ 14.33	$ 14.57	$ 14.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,144.66	$ 4,124.06	$ 4,054.4	$ 4,144.9	$ 4,033.32	$ 4,124.3	$ 4,145.06	$ 4,054.64	$ 4,124.46	$ 4,092.45
Annual savings in GHG from electricity savings [kg CO2e/year]	322.2	320.6	315.2	322.2	313.5	320.6	322.2	315.2	320.6	318.1
Annual savings in natural gas [m3/year]	378.48	378.48	378.48	379.93	378.48	379.93	380.89	379.93	380.89	378.48
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,506.65	$ 3,506.65	$ 3,506.65	$ 3,520.04	$ 3,506.65	$ 3,520.04	$ 3,528.92	$ 3,520.04	$ 3,528.92	$ 3,506.65
Annual savings in carbon tax for natural gas [$/year]	$ 875.24	$ 875.24	$ 875.24	$ 878.59	$ 875.24	$ 878.59	$ 880.8	$ 878.59	$ 880.8	$ 875.24
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,381.89	$ 4,381.89	$ 4,381.89	$ 4,398.63	$ 4,381.89	$ 4,398.63	$ 4,409.72	$ 4,398.63	$ 4,409.72	$ 4,381.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	19449.8	19449.8	19449.8	19524.1	19449.8	19524.1	19573.3	19524.1	19573.3	19449.8
Net Present Value [$]	$ 18,257.3	$ 18,343.95	$ 18,414.95	$ 18,486.78	$ 18,492.84	$ 18,573.43	$ 18,574.05	$ 18,644.43	$ 18,660.7	$ 18,667.31
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	10.47	10.47	8.77	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	HRV sre 75	NA	HRV sre 75	NA	NA	HRV sre 75	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$.	$ 1,800.	$.	$.	$ 1,800.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

LARGE 50SAR Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 27,336.79	$ 27,798.29	$ 27,886.79	$ 27,936.79	$ 28,186.79	$ 28,348.29	$ 28,398.29	$ 28,486.79	$ 28,648.29	$ 28,696.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,059.86	$ 41,753.03	$ 41,885.96	$ 41,961.06	$ 42,336.56	$ 42,579.13	$ 42,654.23	$ 42,787.16	$ 43,029.73	$ 43,102.58
Net Present Value [$]	$ 33,764.45	$ 33,677.47	$ 33,917.24	$ 32,094.98	$ 33,953.49	$ 33,829.53	$ 31,997.4	$ 32,311.78	$ 33,865.77	$ 33,793.4
Incremental dollars per GHG saving	$ 1.23	$ 1.25	$ 1.25	$ 1.23	$ 1.26	$ 1.27	$ 1.25	$ 1.25	$ 1.28	$ 1.29
Auxiliary Energy Required Heating [GJ/yr]	288	286.4	288	289.7	288	286.4	288.2	289.8	286.4	282.7
Annual Energy DHW [GJ/yr]	27.1	27.1	25.4	16.2	24.2	25.4	16.2	14.7	24.2	27.2
Annual Energy Space Heating [GJ/yr]	152.4	151.6	152.4	152.7	152.4	151.6	151.9	152.7	151.6	149.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.8
Total Energy [GJ/yr]	209.5	208.7	207.7	198.8	206.6	207	198	197.3	205.8	207.6
Design Heating Load [W]	35946.4	35707.7	35946.4	35495.6	35946.4	35707.7	35256.9	35495.6	35707.7	35068.3
Annual Energy Electricity [kWh/yr]	50654.3	50441	50654.3	50732	50654.3	50441	50514.8	50734	50441	50136.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,104.27	$ 7,074.09	$ 7,104.27	$ 7,115.26	$ 7,104.27	$ 7,074.09	$ 7,084.53	$ 7,115.55	$ 7,074.09	$ 7,031.03
Annual Energy Natural Gas [m3/yr]	728.9	729	681.5	434.1	650	681.5	434.1	393.7	650	729.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 314.42	$ 314.47	$ 293.98	$ 187.26	$ 280.39	$ 293.98	$ 187.26	$ 169.83	$ 280.39	$ 314.51
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17830	18100	17831	17833	17832	18101	18103	17834	18102	17848
Upgrade Package List	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031	Pkg2221101031	Pkg2221102031	Pkg2221101032
GHGI [kg/m2]	3.82	3.82	3.64	2.72	3.53	3.64	2.71	2.57	3.52	3.81
% ICC	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	156.6	155.7	156.6	157.5	156.6	155.7	156.6	157.5	155.7	153.7
Output: MEUI [kWh/(m2 * yr)]	99.6	99.2	98.7	93.8	98	98.3	93.4	93	97.6	98.6
Output: Better than ERS (%)	71840.0%	71520.0%	71130.0%	67660.0%	70700.0%	70860.0%	67340.0%	67070.0%	70390.0%	71090.0%
Output: Better than Envelope (%)	1110.0%	1160.0%	1110.0%	1060.0%	1110.0%	1160.0%	1100.0%	1050.0%	1160.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	40998	40785	40998	41076	40998	40785	40859	41078	40785	40481
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,780.79	$ 5,750.71	$ 5,780.79	$ 5,791.74	$ 5,780.79	$ 5,750.71	$ 5,761.12	$ 5,792.03	$ 5,750.71	$ 5,707.81
Annual savings in carbon tax for electricity [$/year]	$ 20.5	$ 20.39	$ 20.5	$ 20.54	$ 20.5	$ 20.39	$ 20.43	$ 20.54	$ 20.39	$ 20.24
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,801.29	$ 5,771.11	$ 5,801.29	$ 5,812.28	$ 5,801.29	$ 5,771.11	$ 5,781.55	$ 5,812.57	$ 5,771.11	$ 5,728.05
Annual savings in GHG from electricity savings [kg CO2e/year]	451	448.6	451	451.8	451	448.6	449.4	451.9	448.6	445.3
Annual savings in natural gas [m3/year]	440.91	440.9	442.67	451.89	443.85	442.67	451.89	453.4	443.85	440.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,085.	$ 4,084.97	$ 4,101.37	$ 4,186.77	$ 4,112.24	$ 4,101.37	$ 4,186.77	$ 4,200.72	$ 4,112.24	$ 4,084.94
Annual savings in carbon tax for natural gas [$/year]	$ 1,019.6	$ 1,019.59	$ 1,023.68	$ 1,045.	$ 1,026.4	$ 1,023.68	$ 1,045.	$ 1,048.48	$ 1,026.4	$ 1,019.58
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,104.6	$ 5,104.56	$ 5,125.05	$ 5,231.77	$ 5,138.64	$ 5,125.05	$ 5,231.77	$ 5,249.2	$ 5,138.64	$ 5,104.52
Annual savings in GHG from natural gas savings [kg CO2e/year]	22657.7	22657.5	22748.5	23222.2	22808.8	22748.5	23222.2	23299.5	22808.8	22657.3
Net Present Value [$]	$ 33,764.45	$ 33,677.47	$ 33,917.24	$ 32,094.98	$ 33,953.49	$ 33,829.53	$ 31,997.4	$ 32,311.78	$ 33,865.77	$ 33,793.4
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$ 600.	$.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 850.	$ 550.	$.	$ 550.	$ 850.	$.

LARGE 50SAR Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 27,936.79	$ 27,336.79	$ 28,398.29	$ 28,486.79	$ 27,886.79	$ 27,798.29	$ 28,786.79	$ 28,186.79	$ 28,948.29	$ 28,348.29
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 41,961.06	$ 41,059.86	$ 42,654.23	$ 42,787.16	$ 41,885.96	$ 41,753.03	$ 43,237.76	$ 42,336.56	$ 43,480.33	$ 42,579.13
Net Present Value [$]	$ 32,094.98	$ 33,764.45	$ 31,997.4	$ 32,311.78	$ 33,917.24	$ 33,677.47	$ 32,389.89	$ 33,953.49	$ 32,213.84	$ 33,829.53
Incremental dollars per GHG saving	$ 1.23	$ 1.23	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.26	$ 1.26	$ 1.27	$ 1.27
Auxiliary Energy Required Heating [GJ/yr]	289.7	288	288.2	289.8	288	286.4	289.8	288	288.2	286.4
Annual Energy DHW [GJ/yr]	16.2	27.1	16.2	14.7	25.4	27.1	13.7	24.2	14.7	25.4
Annual Energy Space Heating [GJ/yr]	152.7	152.4	151.9	152.7	152.4	151.6	152.7	152.4	151.9	151.6
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Energy [GJ/yr]	198.8	209.5	198	197.3	207.7	208.7	196.3	206.6	196.5	207
Design Heating Load [W]	35495.6	35946.4	35256.9	35495.6	35946.4	35707.7	35495.6	35946.4	35256.9	35707.7
Annual Energy Electricity [kWh/yr]	50732	50654.3	50514.8	50734	50654.3	50441	50735.3	50654.3	50516.7	50441
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,115.26	$ 7,104.27	$ 7,084.53	$ 7,115.55	$ 7,104.27	$ 7,074.09	$ 7,115.73	$ 7,104.27	$ 7,084.8	$ 7,074.09
Annual Energy Natural Gas [m3/yr]	434.1	728.9	434.1	393.7	681.5	729	366.8	650	393.7	681.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 314.42	$ 187.26	$ 169.83	$ 293.98	$ 314.47	$ 158.22	$ 280.39	$ 169.83	$ 293.98
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17833	17830	18103	17834	17831	18100	17835	17832	18104	18101
Upgrade Package List	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221101031	Pkg2221101031	Pkg2221102031	Pkg2221102031
GHGI [kg/m2]	2.72	3.82	2.71	2.57	3.64	3.82	2.47	3.53	2.56	3.64
% ICC	2.5%	2.4%	2.5%	2.5%	2.5%	2.5%	2.6%	2.5%	2.6%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	157.5	156.6	156.6	157.5	156.6	155.7	157.5	156.6	156.7	155.7
Output: MEUI [kWh/(m2 * yr)]	93.8	99.6	93.4	93	98.7	99.2	92.5	98	92.6	98.3
Output: Better than ERS (%)	67660.0%	71840.0%	67340.0%	67070.0%	71130.0%	71520.0%	66680.0%	70700.0%	66760.0%	70860.0%
Output: Better than Envelope (%)	1060.0%	1110.0%	1100.0%	1050.0%	1110.0%	1160.0%	1050.0%	1110.0%	1100.0%	1160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	41076	40998	40859	41078	40998	40785	41080	40998	40861	40785
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,791.74	$ 5,780.79	$ 5,761.12	$ 5,792.03	$ 5,780.79	$ 5,750.71	$ 5,792.21	$ 5,780.79	$ 5,761.39	$ 5,750.71
Annual savings in carbon tax for electricity [$/year]	$ 20.54	$ 20.5	$ 20.43	$ 20.54	$ 20.5	$ 20.39	$ 20.54	$ 20.5	$ 20.43	$ 20.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,812.28	$ 5,801.29	$ 5,781.55	$ 5,812.57	$ 5,801.29	$ 5,771.11	$ 5,812.75	$ 5,801.29	$ 5,781.82	$ 5,771.11
Annual savings in GHG from electricity savings [kg CO2e/year]	451.8	451	449.4	451.9	451	448.6	451.9	451	449.5	448.6
Annual savings in natural gas [m3/year]	451.89	440.91	451.89	453.4	442.67	440.9	454.4	443.85	453.4	442.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,186.77	$ 4,085.	$ 4,186.77	$ 4,200.72	$ 4,101.37	$ 4,084.97	$ 4,210.	$ 4,112.24	$ 4,200.72	$ 4,101.37
Annual savings in carbon tax for natural gas [$/year]	$ 1,045.	$ 1,019.6	$ 1,045.	$ 1,048.48	$ 1,023.68	$ 1,019.59	$ 1,050.8	$ 1,026.4	$ 1,048.48	$ 1,023.68
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,231.77	$ 5,104.6	$ 5,231.77	$ 5,249.2	$ 5,125.05	$ 5,104.56	$ 5,260.8	$ 5,138.64	$ 5,249.2	$ 5,125.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	23222.2	22657.7	23222.2	23299.5	22748.5	22657.5	23351	22808.8	23299.5	22748.5
Net Present Value [$]	$ 32,094.98	$ 33,764.45	$ 31,997.4	$ 32,311.78	$ 33,917.24	$ 33,677.47	$ 32,389.89	$ 33,953.49	$ 32,213.84	$ 33,829.53
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	10.47	8.77	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$.	$ 600.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$ 550.	$ 550.

LARGE 50SAR Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 30,198.29	$ 29,736.79	$ 30,748.29	$ 31,694.83	$ 30,286.79	$ 31,048.29	$ 31,233.33	$ 30,586.79	$ 28,398.29	$ 29,758.29
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 45,357.83	$ 44,664.66	$ 46,183.93	$ 47,605.63	$ 45,490.76	$ 46,634.53	$ 46,912.46	$ 45,941.36	$ 42,654.23	$ 44,696.95
Net Present Value [$]	$ 31,551.6	$ 31,629.1	$ 31,768.04	$ 31,795.98	$ 31,845.72	$ 31,846.34	$ 31,863.79	$ 31,923.83	$ 31,997.4	$ 32,005.36
Incremental dollars per GHG saving	$ 1.33	$ 1.31	$ 1.35	$ 1.39	$ 1.33	$ 1.36	$ 1.37	$ 1.34	$ 1.25	$ 1.31
Auxiliary Energy Required Heating [GJ/yr]	280.3	281.9	280.3	276.8	281.9	280.4	278.4	281.9	288.2	282.9
Annual Energy DHW [GJ/yr]	16.2	16.2	14.7	16.2	14.7	13.7	16.2	13.7	16.2	16.2
Annual Energy Space Heating [GJ/yr]	148.1	148.8	148.1	146.3	148.8	148.1	147.1	148.8	151.9	149.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.2	1.8
Total Energy [GJ/yr]	194.9	195.6	193.4	193.1	194.1	192.4	193.9	193.1	198	196.1
Design Heating Load [W]	34155.3	34394	34155.3	33822.4	34394	34155.3	34061.1	34394	35256.9	34378.8
Annual Energy Electricity [kWh/yr]	49642.5	49851.8	49644.4	49156.1	49853.8	49645.7	49361.7	49855.1	50514.8	49989.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,961.1	$ 6,990.71	$ 6,961.37	$ 6,892.27	$ 6,991.	$ 6,961.55	$ 6,921.37	$ 6,991.18	$ 7,084.53	$ 7,010.21
Annual Energy Natural Gas [m3/yr]	434.1	434.1	393.7	434.1	393.7	366.8	434.1	366.8	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 169.83	$ 158.22	$ 187.26	$ 158.22	$ 187.26	$ 187.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	18139	17869	18140	21271	17870	18141	21001	17871	18103	18121
Upgrade Package List	Pkg2221102033	Pkg2221101033	Pkg2221102033	Pkg2231102033	Pkg2221101033	Pkg2221102033	Pkg2231101033	Pkg2221101033	Pkg2221102031	Pkg2221102032
GHGI [kg/m2]	2.7	2.7	2.54	2.68	2.55	2.44	2.69	2.45	2.71	2.7
% ICC	2.7%	2.6%	2.7%	2.8%	2.7%	2.8%	2.8%	2.7%	2.5%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	152.4	153.2	152.4	150.5	153.2	152.4	151.3	153.3	156.6	153.8
Output: MEUI [kWh/(m2 * yr)]	91.7	92.1	90.9	90.7	91.3	90.3	91.1	90.7	93.4	92.4
Output: Better than ERS (%)	66130.0%	66410.0%	65550.0%	65430.0%	65820.0%	65160.0%	65740.0%	65430.0%	67340.0%	66600.0%
Output: Better than Envelope (%)	1350.0%	1300.0%	1350.0%	1450.0%	1300.0%	1340.0%	1400.0%	1300.0%	1100.0%	1270.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	39987	40196	39989	39500	40198	39990	39706	40199	40859	40334
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,638.12	$ 5,667.64	$ 5,638.39	$ 5,569.54	$ 5,667.92	$ 5,638.58	$ 5,598.53	$ 5,668.1	$ 5,761.12	$ 5,687.07
Annual savings in carbon tax for electricity [$/year]	$ 19.99	$ 20.1	$ 19.99	$ 19.75	$ 20.1	$ 19.99	$ 19.85	$ 20.1	$ 20.43	$ 20.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,658.12	$ 5,687.73	$ 5,658.39	$ 5,589.29	$ 5,688.02	$ 5,658.57	$ 5,618.38	$ 5,688.2	$ 5,781.55	$ 5,707.23
Annual savings in GHG from electricity savings [kg CO2e/year]	439.9	442.2	439.9	434.5	442.2	439.9	436.8	442.2	449.4	443.7
Annual savings in natural gas [m3/year]	451.89	451.89	453.4	451.89	453.4	454.4	451.89	454.4	451.89	451.89
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,186.77	$ 4,186.77	$ 4,200.72	$ 4,186.77	$ 4,200.72	$ 4,210.	$ 4,186.77	$ 4,210.	$ 4,186.77	$ 4,186.77
Annual savings in carbon tax for natural gas [$/year]	$ 1,045.	$ 1,045.	$ 1,048.48	$ 1,045.	$ 1,048.48	$ 1,050.8	$ 1,045.	$ 1,050.8	$ 1,045.	$ 1,045.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,231.77	$ 5,231.77	$ 5,249.2	$ 5,231.77	$ 5,249.2	$ 5,260.8	$ 5,231.77	$ 5,260.8	$ 5,231.77	$ 5,231.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	23222.2	23222.2	23299.5	23222.2	23299.5	23351	23222.2	23351	23222.2	23222.2
Net Present Value [$]	$ 31,551.6	$ 31,629.1	$ 31,768.04	$ 31,795.98	$ 31,845.72	$ 31,846.34	$ 31,863.79	$ 31,923.83	$ 31,997.4	$ 32,005.36
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	8.77	10.47	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$.	$ 550.	$ 850.	$.	$ 850.	$.	$.

LARGE 50SAR Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 39,404.21	$ 39,454.21	$ 39,704.21	$ 39,755.71	$ 39,794.21	$ 39,844.21	$ 39,865.71	$ 39,894.21	$ 39,915.71	$ 40,004.21
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 59,185.12	$ 59,260.22	$ 59,635.72	$ 59,713.08	$ 59,770.9	$ 59,846.	$ 59,878.3	$ 59,921.1	$ 59,953.4	$ 60,086.32
Net Present Value [$]	$ 33,810.08	$ 31,978.08	$ 33,846.08	$ 33,106.08	$ 33,324.49	$ 33,351.76	$ 33,729.49	$ 31,535.46	$ 31,919.03	$ 32,194.34
Incremental dollars per GHG saving	$ 1.76	$ 1.73	$ 1.77	$ 1.79	$ 1.79	$ 1.78	$ 1.78	$ 1.75	$ 1.75	$ 1.75
Auxiliary Energy Required Heating [GJ/yr]	256.2	258	256.2	252.1	252.4	253.7	254.7	255.5	256.5	258
Annual Energy DHW [GJ/yr]	25.4	16.2	24.2	27.2	27.2	25.4	25.4	16.2	16.2	14.7
Annual Energy Space Heating [GJ/yr]	135.5	135.8	135.5	133.4	133.7	134.2	134.7	134.5	135	135.8
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	191.5	182.5	190.3	191.2	191.5	190.2	190.7	181.3	181.8	181
Design Heating Load [W]	31696.6	31248.2	31696.6	31234.4	31425.2	31473.1	31457.9	31024.7	31009.5	31248.2
Annual Energy Electricity [kWh/yr]	46138.6	46212.8	46138.6	45574.1	45643.6	45789.6	45928	45870	46010.6	46214.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,465.3	$ 6,475.8	$ 6,465.3	$ 6,385.42	$ 6,395.25	$ 6,415.91	$ 6,435.5	$ 6,427.29	$ 6,447.18	$ 6,476.07
Annual Energy Natural Gas [m3/yr]	681.6	434.1	650.1	729.1	729.2	681.6	681.6	434.1	434.1	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 294.02	$ 187.26	$ 280.43	$ 314.51	$ 314.55	$ 294.02	$ 294.02	$ 187.26	$ 187.26	$ 169.83
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43427	43429	43428	43660	43462	43445	43643	43447	43645	43430
Upgrade Package List	Pkg3321201032	Pkg3321201032	Pkg3321201032	Pkg3321202033	Pkg3321201034	Pkg3321201033	Pkg3321202032	Pkg3321201033	Pkg3321202032	Pkg3321201032
GHGI [kg/m2]	3.55	2.62	3.43	3.71	3.71	3.54	3.54	2.61	2.62	2.47
% ICC	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	139.3	140.3	139.3	137.1	137.2	137.9	138.4	138.9	139.4	140.3
Output: MEUI [kWh/(m2 * yr)]	89.9	85	89.2	89.7	89.8	89.2	89.4	84.3	84.6	84.2
Output: Better than ERS (%)	64800.0%	61290.0%	64340.0%	64690.0%	64800.0%	64300.0%	64490.0%	60820.0%	61020.0%	60700.0%
Output: Better than Envelope (%)	2090.0%	2030.0%	2090.0%	2220.0%	2210.0%	2170.0%	2140.0%	2110.0%	2080.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36483	36557	36483	35918	35988	36134	36272	36214	36355	36559
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,144.07	$ 5,154.54	$ 5,144.07	$ 5,064.48	$ 5,074.28	$ 5,094.87	$ 5,114.38	$ 5,106.2	$ 5,126.03	$ 5,154.8
Annual savings in carbon tax for electricity [$/year]	$ 18.24	$ 18.28	$ 18.24	$ 17.96	$ 17.99	$ 18.07	$ 18.14	$ 18.11	$ 18.18	$ 18.28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,162.32	$ 5,172.82	$ 5,162.32	$ 5,082.44	$ 5,092.27	$ 5,112.93	$ 5,132.52	$ 5,124.31	$ 5,144.2	$ 5,173.08
Annual savings in GHG from electricity savings [kg CO2e/year]	401.3	402.1	401.3	395.1	395.9	397.5	399	398.4	399.9	402.1
Annual savings in natural gas [m3/year]	442.67	451.89	443.84	440.9	440.9	442.67	442.67	451.89	451.89	453.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,101.33	$ 4,186.77	$ 4,112.21	$ 4,084.94	$ 4,084.9	$ 4,101.33	$ 4,101.33	$ 4,186.77	$ 4,186.77	$ 4,200.72
Annual savings in carbon tax for natural gas [$/year]	$ 1,023.67	$ 1,045.	$ 1,026.39	$ 1,019.58	$ 1,019.57	$ 1,023.67	$ 1,023.67	$ 1,045.	$ 1,045.	$ 1,048.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,125.01	$ 5,231.77	$ 5,138.59	$ 5,104.52	$ 5,104.47	$ 5,125.01	$ 5,125.01	$ 5,231.77	$ 5,231.77	$ 5,249.2
Annual savings in GHG from natural gas savings [kg CO2e/year]	22748.3	23222.2	22808.6	22657.3	22657.2	22748.3	22748.3	23222.2	23222.2	23299.5
Net Present Value [$]	$ 33,810.08	$ 31,978.08	$ 33,846.08	$ 33,106.08	$ 33,324.49	$ 33,351.76	$ 33,729.49	$ 31,535.46	$ 31,919.03	$ 32,194.34
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	NA	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$ 600.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$.	$ 850.	$.	$.	$ 550.	$ 550.	$.	$.	$ 550.

LARGE 50SAR Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 39,454.21	$ 40,004.21	$ 39,894.21	$ 39,915.71	$ 40,304.21	$ 39,404.21	$ 40,444.21	$ 40,465.71	$ 40,355.71	$ 40,394.21
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 59,260.22	$ 60,086.32	$ 59,921.1	$ 59,953.4	$ 60,536.92	$ 59,185.12	$ 60,747.2	$ 60,779.5	$ 60,614.28	$ 60,672.1
Net Present Value [$]	$ 31,978.08	$ 32,194.34	$ 31,535.46	$ 31,919.03	$ 32,272.63	$ 33,810.08	$ 31,751.9	$ 32,135.29	$ 31,436.24	$ 31,659.16
Incremental dollars per GHG saving	$ 1.73	$ 1.75	$ 1.75	$ 1.75	$ 1.76	$ 1.76	$ 1.77	$ 1.77	$ 1.77	$ 1.77
Auxiliary Energy Required Heating [GJ/yr]	258	258	255.5	256.5	258.1	256.2	255.5	256.5	253.9	254.1
Annual Energy DHW [GJ/yr]	16.2	14.7	16.2	16.2	13.7	25.4	14.7	14.7	16.2	16.2
Annual Energy Space Heating [GJ/yr]	135.8	135.8	134.5	135	135.8	135.5	134.5	135	133.7	134
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	182.5	181	181.3	181.8	180	191.5	179.8	180.3	180.5	180.8
Design Heating Load [W]	31248.2	31248.2	31024.7	31009.5	31248.2	31696.6	31024.7	31009.5	30786	30976.8
Annual Energy Electricity [kWh/yr]	46212.8	46214.7	45870	46010.6	46216	46138.6	45871.9	46012.5	45652.2	45723.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,475.8	$ 6,476.07	$ 6,427.29	$ 6,447.18	$ 6,476.25	$ 6,465.3	$ 6,427.56	$ 6,447.45	$ 6,396.47	$ 6,406.6
Annual Energy Natural Gas [m3/yr]	434.1	393.7	434.1	434.1	366.8	681.6	393.7	393.7	434.1	434.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 169.83	$ 187.26	$ 187.26	$ 158.22	$ 294.02	$ 169.83	$ 169.83	$ 187.26	$ 187.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43429	43430	43447	43645	43431	43427	43448	43646	43663	43465
Upgrade Package List	Pkg3321201032	Pkg3321201032	Pkg3321201033	Pkg3321202032	Pkg3321201032	Pkg3321201032	Pkg3321201033	Pkg3321202032	Pkg3321202033	Pkg3321201034
GHGI [kg/m2]	2.62	2.47	2.61	2.62	2.37	3.55	2.46	2.47	2.61	2.61
% ICC	3.5%	3.5%	3.5%	3.5%	3.6%	3.5%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	140.3	140.3	138.9	139.4	140.3	139.3	138.9	139.4	138	138.2
Output: MEUI [kWh/(m2 * yr)]	85	84.2	84.3	84.6	83.6	89.9	83.5	83.8	83.9	84
Output: Better than ERS (%)	61290.0%	60700.0%	60820.0%	61020.0%	60310.0%	64800.0%	60230.0%	60430.0%	60510.0%	60620.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2110.0%	2080.0%	2030.0%	2090.0%	2110.0%	2080.0%	2160.0%	2150.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36557	36559	36214	36355	36560	36483	36216	36357	35996	36068
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,154.54	$ 5,154.8	$ 5,106.2	$ 5,126.03	$ 5,154.99	$ 5,144.07	$ 5,106.47	$ 5,126.29	$ 5,075.49	$ 5,085.59
Annual savings in carbon tax for electricity [$/year]	$ 18.28	$ 18.28	$ 18.11	$ 18.18	$ 18.28	$ 18.24	$ 18.11	$ 18.18	$ 18.	$ 18.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,172.82	$ 5,173.08	$ 5,124.31	$ 5,144.2	$ 5,173.27	$ 5,162.32	$ 5,124.58	$ 5,144.47	$ 5,093.49	$ 5,103.62
Annual savings in GHG from electricity savings [kg CO2e/year]	402.1	402.1	398.4	399.9	402.2	401.3	398.4	399.9	396	396.7
Annual savings in natural gas [m3/year]	451.89	453.4	451.89	451.89	454.4	442.67	453.4	453.4	451.89	451.89
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,186.77	$ 4,200.72	$ 4,186.77	$ 4,186.77	$ 4,210.	$ 4,101.33	$ 4,200.72	$ 4,200.72	$ 4,186.77	$ 4,186.77
Annual savings in carbon tax for natural gas [$/year]	$ 1,045.	$ 1,048.48	$ 1,045.	$ 1,045.	$ 1,050.8	$ 1,023.67	$ 1,048.48	$ 1,048.48	$ 1,045.	$ 1,045.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,231.77	$ 5,249.2	$ 5,231.77	$ 5,231.77	$ 5,260.8	$ 5,125.01	$ 5,249.2	$ 5,249.2	$ 5,231.77	$ 5,231.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	23222.2	23299.5	23222.2	23222.2	23351	22748.3	23299.5	23299.5	23222.2	23222.2
Net Present Value [$]	$ 31,978.08	$ 32,194.34	$ 31,535.46	$ 31,919.03	$ 32,272.63	$ 33,810.08	$ 31,751.9	$ 32,135.29	$ 31,436.24	$ 31,659.16
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	8.77	8.77	10.47	10.47	8.77
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$ 550.	$ 550.	$ 550.	$.	$.

LARGE 50SAR Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 40,355.71	$ 39,894.21	$ 40,855.71	$ 43,343.71	$ 40,905.71	$ 40,394.21	$ 41,852.25	$ 43,843.71	$ 41,205.71	$ 40,444.21
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 60,614.28	$ 59,921.1	$ 61,365.28	$ 65,102.25	$ 61,440.38	$ 60,672.1	$ 62,862.08	$ 65,853.25	$ 61,890.98	$ 60,747.2
Net Present Value [$]	$ 31,436.24	$ 31,535.46	$ 31,567.61	$ 31,586.51	$ 31,652.68	$ 31,659.16	$ 31,664.73	$ 31,671.13	$ 31,730.79	$ 31,751.9
Incremental dollars per GHG saving	$ 1.77	$ 1.75	$ 1.79	$ 1.9	$ 1.79	$ 1.77	$ 1.83	$ 1.92	$ 1.8	$ 1.77
Auxiliary Energy Required Heating [GJ/yr]	253.9	255.5	252.6	247.2	253.9	254.1	250.4	245.8	254	255.5
Annual Energy DHW [GJ/yr]	16.2	16.2	16.2	16.2	14.7	16.2	16.2	16.2	13.7	14.7
Annual Energy Space Heating [GJ/yr]	133.7	134.5	133.2	129.8	133.7	134	132	129.2	133.7	134.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	180.5	181.3	180	176.5	179	180.8	178.7	176	178	179.8
Design Heating Load [W]	30786	31024.7	30738.1	29590.2	30786	30976.8	30453.1	29542.3	30786	31024.7
Annual Energy Electricity [kWh/yr]	45652.2	45870	45509	44549.9	45654.1	45723.8	45159.6	44388.6	45655.4	45871.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,396.47	$ 6,427.29	$ 6,376.21	$ 6,240.5	$ 6,396.74	$ 6,406.6	$ 6,326.77	$ 6,217.67	$ 6,396.92	$ 6,427.56
Annual Energy Natural Gas [m3/yr]	434.1	434.1	434.1	434.1	393.7	434.1	434.1	434.1	366.8	393.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 187.26	$ 187.26	$ 187.26	$ 187.26	$ 169.83	$ 187.26	$ 187.26	$ 187.26	$ 158.22	$ 169.83
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	43663	43447	43681	50989	43664	43465	45607	51007	43665	43448
Upgrade Package List	Pkg3321202033	Pkg3321201033	Pkg3321202034	Pkg4321302033	Pkg3321202033	Pkg3321201034	Pkg3331202033	Pkg4321302034	Pkg3321202033	Pkg3321201033
GHGI [kg/m2]	2.61	2.61	2.61	2.59	2.46	2.61	2.6	2.58	2.36	2.46
% ICC	3.6%	3.5%	3.6%	3.8%	3.6%	3.6%	3.7%	3.9%	3.7%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	138	138.9	137.3	134.4	138	138.2	136.1	133.6	138.1	138.9
Output: MEUI [kWh/(m2 * yr)]	83.9	84.3	83.6	81.7	83.1	84	82.9	81.4	82.5	83.5
Output: Better than ERS (%)	60510.0%	60820.0%	60310.0%	58950.0%	59920.0%	60620.0%	59800.0%	58750.0%	59530.0%	60230.0%
Output: Better than Envelope (%)	2160.0%	2110.0%	2200.0%	2370.0%	2160.0%	2150.0%	2270.0%	2410.0%	2160.0%	2110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	35996	36214	35853	34894	35998	36068	35504	34733	36000	36216
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,075.49	$ 5,106.2	$ 5,055.3	$ 4,920.07	$ 5,075.76	$ 5,085.59	$ 5,006.04	$ 4,897.32	$ 5,075.94	$ 5,106.47
Annual savings in carbon tax for electricity [$/year]	$ 18.	$ 18.11	$ 17.93	$ 17.45	$ 18.	$ 18.03	$ 17.75	$ 17.37	$ 18.	$ 18.11
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,093.49	$ 5,124.31	$ 5,073.23	$ 4,937.52	$ 5,093.76	$ 5,103.62	$ 5,023.79	$ 4,914.69	$ 5,093.94	$ 5,124.58
Annual savings in GHG from electricity savings [kg CO2e/year]	396	398.4	394.4	383.8	396	396.7	390.5	382.1	396	398.4
Annual savings in natural gas [m3/year]	451.89	451.89	451.89	451.89	453.4	451.89	451.89	451.89	454.4	453.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,186.77	$ 4,186.77	$ 4,186.77	$ 4,186.77	$ 4,200.72	$ 4,186.77	$ 4,186.77	$ 4,186.77	$ 4,210.	$ 4,200.72
Annual savings in carbon tax for natural gas [$/year]	$ 1,045.	$ 1,045.	$ 1,045.	$ 1,045.	$ 1,048.48	$ 1,045.	$ 1,045.	$ 1,045.	$ 1,050.8	$ 1,048.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,231.77	$ 5,231.77	$ 5,231.77	$ 5,231.77	$ 5,249.2	$ 5,231.77	$ 5,231.77	$ 5,231.77	$ 5,260.8	$ 5,249.2
Annual savings in GHG from natural gas savings [kg CO2e/year]	23222.2	23222.2	23222.2	23222.2	23299.5	23222.2	23222.2	23222.2	23351	23299.5
Net Present Value [$]	$ 31,436.24	$ 31,535.46	$ 31,567.61	$ 31,586.51	$ 31,652.68	$ 31,659.16	$ 31,664.73	$ 31,671.13	$ 31,730.79	$ 31,751.9
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	8.77	10.47	10.47	10.47	8.77	10.47	10.47	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.

LARGE 50SAR Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 28,696.79	$ 28,833.33	$ 29,136.79	$ 29,158.29	$ 29,246.79	$ 29,294.83	$ 29,296.79	$ 29,383.33	$ 29,546.79	$ 29,598.29
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,102.58	$ 43,307.66	$ 43,763.46	$ 43,795.75	$ 43,928.68	$ 44,000.83	$ 44,003.78	$ 44,133.76	$ 44,379.28	$ 44,456.63
Net Present Value [$]	$ 53,191.39	$ 53,479.06	$ 52,470.88	$ 52,945.74	$ 53,331.08	$ 53,245.83	$ 51,175.13	$ 53,618.51	$ 53,357.13	$ 52,224.01
Incremental dollars per GHG saving	$ 1.14	$ 1.14	$ 1.15	$ 1.15	$ 1.15	$ 1.16	$ 1.13	$ 1.16	$ 1.16	$ 1.17
Auxiliary Energy Required Heating [GJ/yr]	326.6	328.4	323.7	324.8	326.6	326.7	327.8	328.4	326.6	322
Annual Energy DHW [GJ/yr]	27.6	27.5	27.6	27.6	25.7	27.5	16.5	25.7	24.5	27.6
Annual Energy Space Heating [GJ/yr]	199.1	200	197.5	198.1	199.1	199	199	200	199.1	196.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.2	1.8	1.8	1.8	1.2	1.8	1.2	1.8	1.8
Total Energy [GJ/yr]	256	256.2	254.4	255	254.2	255.2	244.8	254.4	253	253.4
Design Heating Load [W]	36822.2	37405.3	36587.7	36571.8	36822.2	37154.8	36330.1	37405.3	36822.2	36337.3
Annual Energy Electricity [kWh/yr]	63457.8	63517.7	63007	63183.1	63457.8	63247.9	63408.9	63517.7	63457.8	62731.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,915.96	$ 8,924.44	$ 8,852.18	$ 8,877.09	$ 8,915.96	$ 8,886.26	$ 8,909.04	$ 8,924.44	$ 8,915.96	$ 8,813.19
Annual Energy Natural Gas [m3/yr]	739.9	739.5	739.9	739.9	690.9	739.5	442.6	690.5	658.2	740
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 319.17	$ 318.99	$ 319.17	$ 319.17	$ 298.03	$ 318.99	$ 190.92	$ 297.86	$ 283.92	$ 319.21
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17848	20962	17866	18118	17849	21232	17851	20963	17850	18136
Upgrade Package List	Pkg2221101032	Pkg2231101031	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2231102031	Pkg2221101032	Pkg2231101031	Pkg2221101032	Pkg2221102033
GHGI [kg/m2]	4.14	4.14	4.13	4.13	3.95	4.13	3.02	3.95	3.83	4.12
% ICC	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	177.5	178.5	176	176.6	177.5	177.6	178.2	178.5	177.5	175.1
Output: MEUI [kWh/(m2 * yr)]	125.1	125.2	124.2	124.5	124.1	124.6	118.9	124.2	123.4	123.6
Output: Better than ERS (%)	90000.0%	90080.0%	89380.0%	89610.0%	89300.0%	89690.0%	85620.0%	89380.0%	88830.0%	88980.0%
Output: Better than Envelope (%)	1050.0%	1000.0%	1130.0%	1100.0%	1050.0%	1050.0%	1020.0%	1000.0%	1050.0%	1180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	53480	53539	53029	53205	53480	53270	53431	53539	53480	52753
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,540.61	$ 7,549.06	$ 7,477.05	$ 7,501.88	$ 7,540.61	$ 7,511.01	$ 7,533.71	$ 7,549.06	$ 7,540.61	$ 7,438.2
Annual savings in carbon tax for electricity [$/year]	$ 26.74	$ 26.77	$ 26.51	$ 26.6	$ 26.74	$ 26.63	$ 26.72	$ 26.77	$ 26.74	$ 26.38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,567.35	$ 7,575.83	$ 7,503.56	$ 7,528.48	$ 7,567.35	$ 7,537.65	$ 7,560.43	$ 7,575.83	$ 7,567.35	$ 7,464.58
Annual savings in GHG from electricity savings [kg CO2e/year]	588.3	588.9	583.3	585.3	588.3	586	587.7	588.9	588.3	580.3
Annual savings in natural gas [m3/year]	503.47	503.48	503.47	503.47	505.29	503.48	514.55	505.31	506.51	503.46
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,664.64	$ 4,664.77	$ 4,664.64	$ 4,664.64	$ 4,681.55	$ 4,664.77	$ 4,767.27	$ 4,681.69	$ 4,692.84	$ 4,664.6
Annual savings in carbon tax for natural gas [$/year]	$ 1,164.27	$ 1,164.31	$ 1,164.27	$ 1,164.27	$ 1,168.49	$ 1,164.31	$ 1,189.89	$ 1,168.53	$ 1,171.31	$ 1,164.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,828.91	$ 5,829.08	$ 5,828.91	$ 5,828.91	$ 5,850.04	$ 5,829.08	$ 5,957.15	$ 5,850.22	$ 5,864.15	$ 5,828.86
Annual savings in GHG from natural gas savings [kg CO2e/year]	25872.7	25873.5	25872.7	25872.7	25966.5	25873.5	26441.9	25967.3	26029.1	25872.5
Net Present Value [$]	$ 53,191.39	$ 53,479.06	$ 52,470.88	$ 52,945.74	$ 53,331.08	$ 53,245.83	$ 51,175.13	$ 53,618.51	$ 53,357.13	$ 52,224.01
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	10.47	8.77	10.47	8.77	8.77	8.77	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	NA	HRV sre 60	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

LARGE 50SAR Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 29,296.79	$ 28,696.79	$ 28,833.33	$ 29,736.79	$ 29,758.29	$ 29,846.79	$ 29,136.79	$ 29,246.79	$ 29,158.29	$ 29,894.83
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 44,003.78	$ 43,102.58	$ 43,307.66	$ 44,664.66	$ 44,696.95	$ 44,829.88	$ 43,763.46	$ 43,928.68	$ 43,795.75	$ 44,902.03
Net Present Value [$]	$ 51,175.13	$ 53,191.39	$ 53,479.06	$ 50,485.48	$ 50,963.44	$ 51,380.29	$ 52,470.88	$ 53,331.08	$ 52,945.74	$ 51,271.8
Incremental dollars per GHG saving	$ 1.13	$ 1.14	$ 1.14	$ 1.15	$ 1.15	$ 1.15	$ 1.15	$ 1.15	$ 1.15	$ 1.16
Auxiliary Energy Required Heating [GJ/yr]	327.8	326.6	328.4	325	326.1	327.8	323.7	326.6	324.8	327.9
Annual Energy DHW [GJ/yr]	16.5	27.6	27.5	16.5	16.5	14.9	27.6	25.7	27.6	16.5
Annual Energy Space Heating [GJ/yr]	199	199.1	200	197.4	198	199	197.5	199.1	198.1	198.9
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.2	1.8	1.8	1.8	1.8	1.8	1.8	1.2
Total Energy [GJ/yr]	244.8	256	256.2	243.2	243.8	243.2	254.4	254.2	255	244.1
Design Heating Load [W]	36330.1	36822.2	37405.3	36095.6	36079.7	36330.1	36587.7	36822.2	36571.8	36662.7
Annual Energy Electricity [kWh/yr]	63408.9	63517.7	63517.7	62970.1	63147.4	63411.2	63007	63457.8	63183.1	63214.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,909.04	$ 8,915.96	$ 8,924.44	$ 8,846.95	$ 8,872.04	$ 8,909.37	$ 8,852.18	$ 8,915.96	$ 8,877.09	$ 8,881.48
Annual Energy Natural Gas [m3/yr]	442.6	739.9	739.5	442.6	442.6	400.7	739.9	690.9	739.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 319.17	$ 318.99	$ 190.92	$ 190.92	$ 172.85	$ 319.17	$ 298.03	$ 319.17	$ 190.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	17851	17848	20962	17869	18121	17852	17866	17849	18118	21235
Upgrade Package List	Pkg2221101032	Pkg2221101032	Pkg2231101031	Pkg2221101033	Pkg2221102032	Pkg2221101032	Pkg2221101033	Pkg2221101032	Pkg2221102032	Pkg2231102031
GHGI [kg/m2]	3.02	4.14	4.14	3.01	3.02	2.87	4.13	3.95	4.13	3.02
% ICC	2.6%	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	178.2	177.5	178.5	176.7	177.3	178.2	176	177.5	176.6	178.3
Output: MEUI [kWh/(m2 * yr)]	118.9	125.1	125.2	118.1	118.4	118.1	124.2	124.1	124.5	118.6
Output: Better than ERS (%)	85620.0%	90000.0%	90080.0%	85000.0%	85230.0%	85000.0%	89380.0%	89300.0%	89610.0%	85350.0%
Output: Better than Envelope (%)	1020.0%	1050.0%	1000.0%	1090.0%	1060.0%	1020.0%	1130.0%	1050.0%	1100.0%	1010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	53431	53480	53539	52992	53169	53433	53029	53480	53205	53236
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,533.71	$ 7,540.61	$ 7,549.06	$ 7,471.84	$ 7,496.84	$ 7,534.04	$ 7,477.05	$ 7,540.61	$ 7,501.88	$ 7,506.25
Annual savings in carbon tax for electricity [$/year]	$ 26.72	$ 26.74	$ 26.77	$ 26.5	$ 26.58	$ 26.72	$ 26.51	$ 26.74	$ 26.6	$ 26.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,560.43	$ 7,567.35	$ 7,575.83	$ 7,498.34	$ 7,523.43	$ 7,560.76	$ 7,503.56	$ 7,567.35	$ 7,528.48	$ 7,532.87
Annual savings in GHG from electricity savings [kg CO2e/year]	587.7	588.3	588.9	582.9	584.9	587.8	583.3	588.3	585.3	585.6
Annual savings in natural gas [m3/year]	514.55	503.47	503.48	514.55	514.55	516.11	503.47	505.29	503.47	514.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,767.27	$ 4,664.64	$ 4,664.77	$ 4,767.27	$ 4,767.27	$ 4,781.73	$ 4,664.64	$ 4,681.55	$ 4,664.64	$ 4,767.27
Annual savings in carbon tax for natural gas [$/year]	$ 1,189.89	$ 1,164.27	$ 1,164.31	$ 1,189.89	$ 1,189.89	$ 1,193.5	$ 1,164.27	$ 1,168.49	$ 1,164.27	$ 1,189.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,957.15	$ 5,828.91	$ 5,829.08	$ 5,957.15	$ 5,957.15	$ 5,975.23	$ 5,828.91	$ 5,850.04	$ 5,828.91	$ 5,957.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	26441.9	25872.7	25873.5	26441.9	26441.9	26522.2	25872.7	25966.5	25872.7	26441.9
Net Present Value [$]	$ 51,175.13	$ 53,191.39	$ 53,479.06	$ 50,485.48	$ 50,963.44	$ 51,380.29	$ 52,470.88	$ 53,331.08	$ 52,945.74	$ 51,271.8
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	8.77	8.77	8.77	10.47	8.77	8.77	8.77	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 639.	$ 639.	$ 639.	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83	$ 15,955.83
Foundation Wall Interior Insulation Cost of Upgrade	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.

LARGE 50SAR Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 41,852.25	$ 40,355.71	$ 42,352.25	$ 41,390.75	$ 42,402.25	$ 40,855.71	$ 40,905.71	$ 39,894.21	$ 41,205.71	$ 41,890.75
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 62,862.08	$ 60,614.28	$ 63,613.08	$ 62,168.91	$ 63,688.18	$ 61,365.28	$ 61,440.38	$ 59,921.1	$ 61,890.98	$ 62,919.91
Net Present Value [$]	$ 46,619.82	$ 46,673.98	$ 46,781.13	$ 46,815.81	$ 46,824.98	$ 46,832.	$ 46,878.95	$ 46,909.59	$ 46,950.21	$ 46,977.85
Incremental dollars per GHG saving	$ 1.61	$ 1.56	$ 1.63	$ 1.6	$ 1.63	$ 1.58	$ 1.57	$ 1.54	$ 1.58	$ 1.62
Auxiliary Energy Required Heating [GJ/yr]	288.9	292.8	287.6	290.6	288.9	291.5	292.8	294.5	292.8	289.4
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	16.5	14.9	16.5	14.9	16.5	13.9	16.5
Annual Energy Space Heating [GJ/yr]	175	177.2	174.6	176	175.1	176.7	177.2	178.2	177.2	175.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	220.8	223	220.4	221.7	219.3	222.5	221.4	224	220.4	221.3
Design Heating Load [W]	31911.1	32249.4	31860.9	32161.6	31911.1	32199.1	32249.4	32499.8	32249.4	32111.3
Annual Energy Electricity [kWh/yr]	56762.5	57364.8	56630.9	57017.9	56764.8	57232	57367.1	57635.6	57368.7	56886.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,968.58	$ 8,053.8	$ 7,949.96	$ 8,004.72	$ 7,968.9	$ 8,035.01	$ 8,054.13	$ 8,092.12	$ 8,054.36	$ 7,986.14
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	442.6	400.7	442.6	400.7	442.6	372.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 190.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	45607	43663	45625	45391	45608	43681	43664	43447	43665	45409
Upgrade Package List	Pkg3331202033	Pkg3321202033	Pkg3331202034	Pkg3331201033	Pkg3321202033	Pkg3321202034	Pkg3321202033	Pkg3321201033	Pkg3321202033	Pkg3331201034
GHGI [kg/m2]	2.88	2.89	2.88	2.89	2.72	2.89	2.74	2.9	2.63	2.88
% ICC	3.7%	3.6%	3.8%	3.7%	3.8%	3.6%	3.6%	3.5%	3.7%	3.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	157.1	159.1	156.4	158	157.1	158.5	159.2	160.1	159.2	157.3
Output: MEUI [kWh/(m2 * yr)]	105.9	107.1	105.7	106.4	105.1	106.9	106.3	107.6	105.7	106.2
Output: Better than ERS (%)	76250.0%	77110.0%	76090.0%	76600.0%	75660.0%	76910.0%	76480.0%	77500.0%	76090.0%	76450.0%
Output: Better than Envelope (%)	2080.0%	1980.0%	2120.0%	2040.0%	2080.0%	2010.0%	1980.0%	1930.0%	1980.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	46784	47386	46653	47040	46786	47254	47389	47657	47390	46908
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,596.57	$ 6,681.5	$ 6,578.02	$ 6,632.58	$ 6,596.9	$ 6,662.77	$ 6,681.82	$ 6,719.68	$ 6,682.05	$ 6,614.07
Annual savings in carbon tax for electricity [$/year]	$ 23.39	$ 23.69	$ 23.33	$ 23.52	$ 23.39	$ 23.63	$ 23.69	$ 23.83	$ 23.7	$ 23.45
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,619.96	$ 6,705.19	$ 6,601.34	$ 6,656.1	$ 6,620.29	$ 6,686.4	$ 6,705.52	$ 6,743.51	$ 6,705.74	$ 6,637.52
Annual savings in GHG from electricity savings [kg CO2e/year]	514.6	521.3	513.2	517.4	514.7	519.8	521.3	524.2	521.3	516
Annual savings in natural gas [m3/year]	514.55	514.55	514.55	514.55	516.11	514.55	516.11	514.55	517.14	514.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,767.27	$ 4,767.27	$ 4,767.27	$ 4,767.27	$ 4,781.73	$ 4,767.27	$ 4,781.73	$ 4,767.27	$ 4,791.33	$ 4,767.27
Annual savings in carbon tax for natural gas [$/year]	$ 1,189.89	$ 1,189.89	$ 1,189.89	$ 1,189.89	$ 1,193.5	$ 1,189.89	$ 1,193.5	$ 1,189.89	$ 1,195.89	$ 1,189.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,957.15	$ 5,957.15	$ 5,957.15	$ 5,957.15	$ 5,975.23	$ 5,957.15	$ 5,975.23	$ 5,957.15	$ 5,987.22	$ 5,957.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	26441.9	26441.9	26441.9	26441.9	26522.2	26441.9	26522.2	26441.9	26575.4	26441.9
Net Present Value [$]	$ 46,619.82	$ 46,673.98	$ 46,781.13	$ 46,815.81	$ 46,824.98	$ 46,832.	$ 46,878.95	$ 46,909.59	$ 46,950.21	$ 46,977.85
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	8.77	10.47	10.47	10.47	8.77	10.47	8.77
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 639.	$ 1,100.5	$ 639.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 1,089.32	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$.

LARGE 50SAR Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 42,240.75	$ 42,536.96	$ 42,702.25	$ 42,740.75	$ 42,902.25	$ 43,036.96	$ 43,202.25	$ 43,343.71	$ 43,593.5	$ 43,683.5
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 63,445.61	$ 63,890.51	$ 64,138.78	$ 64,196.61	$ 64,439.18	$ 64,641.51	$ 64,889.78	$ 65,102.25	$ 65,477.44	$ 65,612.62
Net Present Value [$]	$ 47,091.87	$ 47,381.32	$ 46,895.88	$ 47,253.9	$ 46,986.11	$ 47,538.24	$ 47,057.	$ 45,620.82	$ 48,004.95	$ 47,174.26
Incremental dollars per GHG saving	$ 1.62	$ 1.63	$ 1.64	$ 1.64	$ 1.65	$ 1.65	$ 1.66	$ 1.67	$ 1.67	$ 1.68
Auxiliary Energy Required Heating [GJ/yr]	290.6	290.5	288.9	289.4	287.7	289.2	287.7	284.5	289.4	285.4
Annual Energy DHW [GJ/yr]	13.9	13.9	13.9	13.9	14.9	13.9	13.9	16.5	13.9	16.5
Annual Energy Space Heating [GJ/yr]	176	176	175.1	175.5	174.6	175.5	174.6	171.6	175.4	173.3
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	219.2	219.2	218.2	218.7	218.8	218.7	217.8	217.3	218.5	219
Design Heating Load [W]	32161.6	32102.2	31911.1	32111.3	31860.9	32052	31860.9	30945.8	31998.5	31713.8
Annual Energy Electricity [kWh/yr]	57021.7	57019.1	56766.3	56890.4	56633.2	56885.8	56634.7	55795.1	56850.9	56266.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,005.26	$ 8,004.89	$ 7,969.12	$ 7,986.68	$ 7,950.28	$ 7,986.03	$ 7,950.5	$ 7,831.69	$ 7,981.09	$ 7,898.39
Annual Energy Natural Gas [m3/yr]	372.9	372.9	372.9	372.9	400.7	372.9	372.9	442.6	372.9	442.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 160.86	$ 160.86	$ 160.86	$ 160.86	$ 172.85	$ 160.86	$ 160.86	$ 190.92	$ 160.86	$ 190.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	45393	43881	45609	45411	45626	43899	45627	50989	45807	45841
Upgrade Package List	Pkg3331201033	Pkg3321203033	Pkg3331202033	Pkg3331201034	Pkg3321202034	Pkg3321203034	Pkg3331202034	Pkg4321302033	Pkg3331203032	Pkg3331203034
GHGI [kg/m2]	2.62	2.62	2.62	2.62	2.72	2.62	2.62	2.86	2.62	2.87
% ICC	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	158	157.9	157.1	157.3	156.4	157.2	156.4	154.7	157.3	155.1
Output: MEUI [kWh/(m2 * yr)]	105	105	104.5	104.8	104.8	104.8	104.3	104	104.7	105
Output: Better than ERS (%)	75620.0%	75620.0%	75230.0%	75430.0%	75470.0%	75430.0%	75080.0%	74880.0%	75350.0%	75550.0%
Output: Better than Envelope (%)	2040.0%	2040.0%	2080.0%	2070.0%	2120.0%	2070.0%	2120.0%	2200.0%	2070.0%	2180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	47043	47041	46788	46912	46655	46908	46656	45817	46873	46288
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,633.12	$ 6,632.75	$ 6,597.11	$ 6,614.61	$ 6,578.34	$ 6,613.96	$ 6,578.55	$ 6,460.17	$ 6,609.04	$ 6,526.64
Annual savings in carbon tax for electricity [$/year]	$ 23.52	$ 23.52	$ 23.39	$ 23.46	$ 23.33	$ 23.45	$ 23.33	$ 22.91	$ 23.44	$ 23.14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,656.64	$ 6,656.27	$ 6,620.5	$ 6,638.06	$ 6,601.67	$ 6,637.41	$ 6,601.88	$ 6,483.08	$ 6,632.47	$ 6,549.78
Annual savings in GHG from electricity savings [kg CO2e/year]	517.5	517.4	514.7	516	513.2	516	513.2	504	515.6	509.2
Annual savings in natural gas [m3/year]	517.14	517.14	517.14	517.14	516.11	517.14	517.14	514.55	517.14	514.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,791.33	$ 4,791.33	$ 4,791.33	$ 4,791.33	$ 4,781.73	$ 4,791.33	$ 4,791.33	$ 4,767.27	$ 4,791.33	$ 4,767.27
Annual savings in carbon tax for natural gas [$/year]	$ 1,195.89	$ 1,195.89	$ 1,195.89	$ 1,195.89	$ 1,193.5	$ 1,195.89	$ 1,195.89	$ 1,189.89	$ 1,195.89	$ 1,189.89
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,987.22	$ 5,987.22	$ 5,987.22	$ 5,987.22	$ 5,975.23	$ 5,987.22	$ 5,987.22	$ 5,957.15	$ 5,987.22	$ 5,957.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	26575.4	26575.4	26575.4	26575.4	26522.2	26575.4	26575.4	26441.9	26575.4	26441.9
Net Present Value [$]	$ 47,091.87	$ 47,381.32	$ 46,895.88	$ 47,253.9	$ 46,986.11	$ 47,538.24	$ 47,057.	$ 45,620.82	$ 48,004.95	$ 47,174.26
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	14.09	10.47	8.77	10.47	14.09	10.47	10.47	14.09	14.09
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80	CeilR80
Attic Ceiling Cost of Upgrade	$ 639.	$ 2,431.75	$ 1,100.5	$ 639.	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 2,431.75
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$ 850.	$.

LARGE 50SAR Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 42,240.75	$ 42,536.96	$ 42,702.25	$ 42,740.75	$ 42,902.25	$ 44,117.71	$ 43,036.96	$ 43,202.25	$ 44,617.71	$ 44,667.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 63,445.61	$ 63,890.51	$ 64,138.78	$ 64,196.61	$ 64,439.18	$ 66,264.8	$ 64,641.51	$ 64,889.78	$ 67,015.8	$ 67,090.9
Net Present Value [$]	$ 47,091.87	$ 47,381.32	$ 46,895.88	$ 47,253.9	$ 46,986.11	$ 52,407.41	$ 47,538.24	$ 47,057.	$ 52,564.51	$ 52,229.62
Incremental dollars per GHG saving	$ 1.62	$ 1.63	$ 1.64	$ 1.64	$ 1.65	$ 1.65	$ 1.65	$ 1.66	$ 1.67	$ 1.67
Auxiliary Energy Required Heating [GJ/yr]	290.6	290.5	288.9	289.4	287.7	292	289.2	287.7	290.7	291.6
Annual Energy DHW [GJ/yr]	13.9	13.9	13.9	13.9	14.9	9.4	13.9	13.9	9.4	8.6
Annual Energy Space Heating [GJ/yr]	176	176	175.1	175.5	174.6	175.7	175.5	174.6	175.2	175.5
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	219.2	219.2	218.2	218.7	218.8	214.5	218.7	217.8	214	213.4
Design Heating Load [W]	32161.6	32102.2	31911.1	32111.3	31860.9	31419.3	32052	31860.9	31369.1	31419.3
Annual Energy Electricity [kWh/yr]	57021.7	57019.1	56766.3	56890.4	56633.2	59570.6	56885.8	56634.7	59437.4	59287.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,005.26	$ 8,004.89	$ 7,969.12	$ 7,986.68	$ 7,950.28	$ 8,365.92	$ 7,986.03	$ 7,950.5	$ 8,347.08	$ 8,325.92
Annual Energy Natural Gas [m3/yr]	372.9	372.9	372.9	372.9	400.7	0	372.9	372.9	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 160.86	$ 160.86	$ 160.86	$ 160.86	$ 172.85	$.	$ 160.86	$ 160.86	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	45393	43881	45609	45411	45626	50992	43899	45627	51010	50993
Upgrade Package List	Pkg3331201033	Pkg3321203033	Pkg3331202033	Pkg3331201034	Pkg3331202034	Pkg4321302033	Pkg3321203034	Pkg3331202034	Pkg4321302034	Pkg4321302033
GHGI [kg/m2]	2.62	2.62	2.62	2.62	2.72	1.28	2.62	2.62	1.28	1.28
% ICC	3.7%	3.8%	3.8%	3.8%	3.8%	3.9%	3.8%	3.8%	4.0%	4.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	158	157.9	157.1	157.3	156.4	158.7	157.2	156.4	158	158.5
Output: MEUI [kWh/(m2 * yr)]	105	105	104.5	104.8	104.8	102.5	104.8	104.3	102.2	101.9
Output: Better than ERS (%)	75620.0%	75620.0%	75230.0%	75430.0%	75470.0%	73790.0%	75430.0%	75080.0%	73590.0%	73360.0%
Output: Better than Envelope (%)	2040.0%	2040.0%	2080.0%	2070.0%	2120.0%	2000.0%	2070.0%	2120.0%	2030.0%	2010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	47043	47041	46788	46912	46655	49592	46908	46656	49459	49310
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,633.12	$ 6,632.75	$ 6,597.11	$ 6,614.61	$ 6,578.34	$ 6,992.51	$ 6,613.96	$ 6,578.55	$ 6,973.73	$ 6,952.65
Annual savings in carbon tax for electricity [$/year]	$ 23.52	$ 23.52	$ 23.39	$ 23.46	$ 23.33	$ 24.8	$ 23.45	$ 23.33	$ 24.73	$ 24.65
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,656.64	$ 6,656.27	$ 6,620.5	$ 6,638.06	$ 6,601.67	$ 7,017.31	$ 6,637.41	$ 6,601.88	$ 6,998.46	$ 6,977.31
Annual savings in GHG from electricity savings [kg CO2e/year]	517.5	517.4	514.7	516	513.2	545.5	516	513.2	544.1	542.4
Annual savings in natural gas [m3/year]	517.14	517.14	517.14	517.14	516.11	531.04	517.14	517.14	531.04	531.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,791.33	$ 4,791.33	$ 4,791.33	$ 4,791.33	$ 4,781.73	$ 4,920.05	$ 4,791.33	$ 4,791.33	$ 4,920.05	$ 4,920.05
Annual savings in carbon tax for natural gas [$/year]	$ 1,195.89	$ 1,195.89	$ 1,195.89	$ 1,195.89	$ 1,193.5	$ 1,228.02	$ 1,195.89	$ 1,195.89	$ 1,228.02	$ 1,228.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,987.22	$ 5,987.22	$ 5,987.22	$ 5,987.22	$ 5,975.23	$ 6,148.07	$ 5,987.22	$ 5,987.22	$ 6,148.07	$ 6,148.07
Annual savings in GHG from natural gas savings [kg CO2e/year]	26575.4	26575.4	26575.4	26575.4	26522.2	27289.4	26575.4	26575.4	27289.4	27289.4
Net Present Value [$]	$ 47,091.87	$ 47,381.32	$ 46,895.88	$ 47,253.9	$ 46,986.11	$ 52,407.41	$ 47,538.24	$ 47,057.	$ 52,564.51	$ 52,229.62
ECM Details Envelope Components										
Attic Ceiling RSI	8.77	14.09	10.47	8.77	10.47	10.47	14.09	10.47	10.47	10.47
Attic Ceiling Code	CeilR50	CeilR80	CeilR60	CeilR50	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 639.	$ 2,431.75	$ 1,100.5	$ 639.	$ 1,100.5	$ 1,100.5	$ 2,431.75	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 6,283.5	$ 6,283.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 850.	$ 850.	$ 550.	$.	$ 850.	$ 850.	$.	$ 550.

LARGE 50SAR Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k	large 50sar.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 44,840.25	$ 43,343.71	$ 45,340.25	$ 45,390.25	$ 43,843.71	$ 45,690.25	$ 43,893.71	$ 45,890.25	$ 44,193.71	$ 44,393.71
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 67,350.06	$ 65,102.25	$ 68,101.06	$ 68,176.16	$ 65,853.25	$ 68,626.76	$ 65,928.35	$ 68,927.16	$ 66,378.95	$ 66,679.35
Net Present Value [$]	$ 45,526.5	$ 45,620.82	$ 45,687.26	$ 45,731.84	$ 45,742.33	$ 45,802.74	$ 45,825.8	$ 45,892.42	$ 45,896.7	$ 45,947.48
Incremental dollars per GHG saving	$ 1.73	$ 1.67	$ 1.75	$ 1.74	$ 1.69	$ 1.75	$ 1.69	$ 1.76	$ 1.7	$ 1.71
Auxiliary Energy Required Heating [GJ/yr]	280.6	284.5	279.4	280.6	283.2	280.7	284.5	279.4	284.5	283.2
Annual Energy DHW [GJ/yr]	16.5	16.5	16.5	14.9	16.5	13.9	14.9	14.9	13.9	14.9
Annual Energy Space Heating [GJ/yr]	169.3	171.6	168.9	169.4	171	169.4	171.6	168.9	171.6	171.1
Annual Energy Plug Loads [GJ/yr]	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Annual Energy Ventilation [GJ/yr]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Energy [GJ/yr]	215.1	217.3	214.6	213.6	216.8	212.5	215.8	213.1	214.8	215.3
Design Heating Load [W]	30607.6	30945.8	30557.3	30607.6	30895.6	30607.6	30945.8	30557.3	30945.8	30895.6
Annual Energy Electricity [kWh/yr]	55177.2	55795.1	55045.4	55179.6	55648.1	55181.1	55797.4	55047.7	55798.9	55650.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,744.26	$ 7,831.69	$ 7,725.61	$ 7,744.6	$ 7,810.89	$ 7,744.81	$ 7,832.02	$ 7,725.93	$ 7,832.23	$ 7,811.22
Annual Energy Natural Gas [m3/yr]	442.6	442.6	442.6	400.7	442.6	372.9	400.7	400.7	372.9	400.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 190.92	$ 190.92	$ 190.92	$ 172.85	$ 190.92	$ 160.86	$ 172.85	$ 172.85	$ 160.86	$ 172.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	51565	50989	51583	51566	51007	51567	50990	51584	50991	51008
Upgrade Package List	Pkg4331302033	Pkg4321302033	Pkg4331302034	Pkg4331302033	Pkg4321302034	Pkg4331302033	Pkg4321302033	Pkg4331302034	Pkg4321302033	Pkg4321302034
GHGI [kg/m2]	2.85	2.86	2.84	2.69	2.86	2.59	2.7	2.69	2.6	2.7
% ICC	4.0%	3.8%	4.0%	4.0%	3.9%	4.1%	3.9%	4.1%	3.9%	3.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	152.5	154.7	151.9	152.6	154	152.6	154.7	151.9	154.7	154
Output: MEUI [kWh/(m2 * yr)]	102.8	104	102.6	102	103.8	101.4	103.2	101.7	102.6	102.9
Output: Better than ERS (%)	74020.0%	74880.0%	73830.0%	73440.0%	74690.0%	73010.0%	74300.0%	73240.0%	73910.0%	74100.0%
Output: Better than Envelope (%)	2310.0%	2200.0%	2340.0%	2310.0%	2240.0%	2310.0%	2200.0%	2340.0%	2200.0%	2240.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	45199	45817	45067	45201	45670	45203	45819	45069	45821	45672
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,373.04	$ 6,460.17	$ 6,354.46	$ 6,373.38	$ 6,439.44	$ 6,373.59	$ 6,460.49	$ 6,354.79	$ 6,460.7	$ 6,439.77
Annual savings in carbon tax for electricity [$/year]	$ 22.6	$ 22.91	$ 22.53	$ 22.6	$ 22.83	$ 22.6	$ 22.91	$ 22.53	$ 22.91	$ 22.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,395.64	$ 6,483.08	$ 6,376.99	$ 6,395.98	$ 6,462.28	$ 6,396.2	$ 6,483.4	$ 6,377.32	$ 6,483.61	$ 6,462.6
Annual savings in GHG from electricity savings [kg CO2e/year]	497.2	504	495.7	497.2	502.4	497.2	504	495.8	504	502.4
Annual savings in natural gas [m3/year]	514.55	514.55	514.55	516.11	514.55	517.14	516.11	516.11	517.14	516.11
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,767.27	$ 4,767.27	$ 4,767.27	$ 4,781.73	$ 4,767.27	$ 4,791.33	$ 4,781.73	$ 4,781.73	$ 4,791.33	$ 4,781.73
Annual savings in carbon tax for natural gas [$/year]	$ 1,189.89	$ 1,189.89	$ 1,189.89	$ 1,193.5	$ 1,189.89	$ 1,195.89	$ 1,193.5	$ 1,193.5	$ 1,195.89	$ 1,193.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,957.15	$ 5,957.15	$ 5,957.15	$ 5,975.23	$ 5,957.15	$ 5,987.22	$ 5,975.23	$ 5,975.23	$ 5,987.22	$ 5,975.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	26441.9	26441.9	26441.9	26522.2	26441.9	26575.4	26522.2	26522.2	26575.4	26522.2
Net Present Value [$]	$ 45,526.5	$ 45,620.82	$ 45,687.26	$ 45,731.84	$ 45,742.33	$ 45,802.74	$ 45,825.8	$ 45,892.42	$ 45,896.7	$ 45,947.48
ECM Details Envelope Components										
Attic Ceiling RSI	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5	$ 1,100.5
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64	$ 5,252.64
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75	$ 19,329.75
Foundation Wall Interior Insulation Cost of Upgrade	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 2,585.86	$ 1,089.32	$ 1,089.32
Foundation Slab Below Grade Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5	$ 8,271.5
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$ 550.	$ 550.	$ 850.	$ 550.

Quad Vancouver Step3: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,740.3	$ 13,740.3	$ 15,408.62	$ 15,408.62	$ 15,809.52	$ 15,809.52	$ 15,913.52	$ 15,940.3	$ 15,940.3	$ 16,106.54
Net Present Value [$]	$ 5,101.11	$ 5,322.22	$ 6,943.62	$ 7,164.54	$ 2,950.79	$ 3,164.23	$ 17,477.38	$ 6,683.61	$ 6,904.54	$ 5,825.55
Incremental dollars per GHG saving	$ 4.98	$ 4.98	$ 5.59	$ 5.59	$ 5.69	$ 5.69	$ 81.03	$ 5.77	$ 5.77	$ 5.82
Auxiliary Energy Required Heating [GJ/yr]	50.3	50.6	50.6	50.9	44.4	44.7	27.2	50	50.3	48
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1	52.9	27.5	27.5	28.1
Annual Energy Space Heating [GJ/yr]	50.3	50.6	50.6	50.9	44.4	44.7	27.2	50	50.3	48
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	183.2	183.5	183.5	183.8	177.3	177.6	184.9	182.4	182.7	180.9
Design Heating Load [W]	10920.7	10969.8	11121.9	11170.9	10988	11037.1	10162.5	10920.7	10969.8	10988
Annual Energy Electricity [kWh/yr]	50895.4	50981.3	50963.1	51048.9	49256.4	49339.3	36659.6	50655.6	50741.4	50257.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,138.38	$ 7,150.54	$ 7,147.96	$ 7,160.1	$ 6,906.47	$ 6,918.2	$ 5,124.02	$ 7,104.45	$ 7,116.59	$ 7,048.15
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	1420.4	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$ 612.71	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39157	38887	19717	19447	385	115	39263	39158	38888	331
Upgrade Package List	Pkg2110101111	Pkg2110101011	Pkg1210101111	Pkg1210101011	Pkg1110101131	Pkg1110101031	Pkg2110101131	Pkg2110101111	Pkg2110101011	Pkg1110101121
GHGI [kg/m2]	1.24	1.24	1.24	1.25	1.20	1.20	6.89	1.24	1.24	1.23
% ICC	1.4%	1.4%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	20	20	20	20	20	20	20	20	20	20
Target Output: Better than Envelope (%)	10	10	10	10	10	10	10	10	10	10
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	30.5	30.7	30.6	30.8	26.9	27.1	16.5	30.3	30.5	29.1
Output: MEUI [kWh/(m2 * yr)]	48.9	49.1	49.1	49.2	45.3	45.5	49.9	48.4	48.6	47.5
Output: Better than ERS (%)	48.6	48.8	48.8	49.1	43.8	44	50	47.9	48.2	46.7
Output: Better than Envelope (%)	30.8	30.4	30.4	30	38.9	38.5	62.6	31.2	30.8	34
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1359	1445	1426	1512	280	197	12877	1119	1205	721
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 191.58	$ 203.69	$ 201.12	$ 213.22	$ 39.52	$ 27.83	$ 1,815.67	$ 157.76	$ 169.86	$ 101.66
Annual savings in carbon tax for electricity [$/year]	$ .68	$ .72	$ .71	$ .76	$ .14	$ .1	$ 6.44	$ .56	$ .6	$ .36
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 192.26	$ 204.41	$ 201.84	$ 213.98	$ 39.66	$ 27.93	$ 1,822.11	$ 158.32	$ 170.47	$ 102.02
Annual savings in GHG from electricity savings [kg CO2e/year]	14.9	15.9	15.7	16.6	3.1	2.2	141.6	12.3	13.3	7.9
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99	1.07	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 9.87	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 2.46	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 12.34	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	54.8	2774.4	2774.4	2774.4
Net Present Value [$]	$ 5,101.11	$ 5,322.22	$ 6,943.62	$ 7,164.54	$ 2,950.79	$ 3,164.23	$ 17,477.38	$ 6,683.61	$ 6,904.54	$ 5,825.55
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93	4.67	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,366.24
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 2,400.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$.

Quad Vancouver Step3: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,740.3	$ 13,740.3	$ 15,408.62	$ 15,408.62	$ 15,809.52	$ 15,809.52	$ 15,940.3	$ 15,940.3	$ 16,106.54	$ 16,106.54
Net Present Value [$]	$ 5,101.11	$ 5,322.22	$ 6,943.62	$ 7,164.54	$ 2,950.79	$ 3,164.23	$ 6,683.61	$ 6,904.54	$ 5,825.55	$ 6,045.74
Incremental dollars per GHG saving	$ 4.98	$ 4.98	$ 5.59	$ 5.59	$ 5.69	$ 5.69	$ 5.77	$ 5.77	$ 5.82	$ 5.82
Auxiliary Energy Required Heating [GJ/yr]	50.3	50.6	50.6	50.9	44.4	44.7	50	50.3	48	48.3
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1	27.5	27.5	28.1	28.1
Annual Energy Space Heating [GJ/yr]	50.3	50.6	50.6	50.9	44.4	44.7	50	50.3	48	48.3
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	183.2	183.5	183.5	183.8	177.3	177.6	182.4	182.7	180.9	181.2
Design Heating Load [W]	10920.7	10969.8	11121.9	11170.9	10988	11037.1	10920.7	10969.8	10988	11037.1
Annual Energy Electricity [kWh/yr]	50895.4	50981.3	50963.1	51048.9	49256.4	49339.3	50655.6	50741.4	50257.7	50343.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,138.38	$ 7,150.54	$ 7,147.96	$ 7,160.1	$ 6,906.47	$ 6,918.2	$ 7,104.45	$ 7,116.59	$ 7,048.15	$ 7,060.25
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39157	38887	19717	19447	385	115	39158	38888	331	61
Upgrade Package List	Pkg2110101111	Pkg2110101011	Pkg1210101111	Pkg1210101011	Pkg1110101131	Pkg1110101031	Pkg2110101111	Pkg2110101011	Pkg1110101121	Pkg1110101021
GHGI [kg/m2]	1.24	1.24	1.24	1.25	1.20	1.20	1.24	1.24	1.23	1.23
% ICC	1.4%	1.4%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	20	20	20	20	20	20	20	20	20	20
Target Output: Better than Envelope (%)	10	10	10	10	10	10	10	10	10	10
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	30.5	30.7	30.6	30.8	26.9	27.1	30.3	30.5	29.1	29.3
Output: MEUI [kWh/(m2 * yr)]	48.9	49.1	49.1	49.2	45.3	45.5	48.4	48.6	47.5	47.7
Output: Better than ERS (%)	48.6	48.8	48.8	49.1	43.8	44	47.9	48.2	46.7	47
Output: Better than Envelope (%)	30.8	30.4	30.4	30	38.9	38.5	31.2	30.8	34	33.6
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1359	1445	1426	1512	280	197	1119	1205	721	806
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 191.58	$ 203.69	$ 201.12	$ 213.22	$ 39.52	$ 27.83	$ 157.76	$ 169.86	$ 101.66	$ 113.72
Annual savings in carbon tax for electricity [$/year]	$ .68	$ .72	$ .71	$ .76	$ .14	$ .1	$ .56	$ .6	$ .36	$ .4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 192.26	$ 204.41	$ 201.84	$ 213.98	$ 39.66	$ 27.93	$ 158.32	$ 170.47	$ 102.02	$ 114.12
Annual savings in GHG from electricity savings [kg CO2e/year]	14.9	15.9	15.7	16.6	3.1	2.2	12.3	13.3	7.9	8.9
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4
Net Present Value [$]	$ 5,101.11	$ 5,322.22	$ 6,943.62	$ 7,164.54	$ 2,950.79	$ 3,164.23	$ 6,683.61	$ 6,904.54	$ 5,825.55	$ 6,045.74
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,366.24	$ 3,366.24
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$.	$.

Quad Vancouver Step3: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,381.84	$ 16,381.84	$ 19,153.52	$ 21,821.84	$ 19,153.52	$ 21,821.84	$ 18,581.84	$ 18,581.84	$ 15,913.52	$ 16,678.86
Net Present Value [$]	$ 19,620.53	$ 19,442.32	$ 18,232.29	$ 18,192.47	$ 18,056.83	$ 18,029.6	$ 17,658.3	$ 17,480.1	$ 17,477.38	$ 17,400.7
Incremental dollars per GHG saving	$ 107.21	$ 107.7	$ 120.61	$ 128.36	$ 121.23	$ 128.9	$ 89.08	$ 89.38	$ 81.03	$ 115.35
Auxiliary Energy Required Heating [GJ/yr]	23.2	23.4	22.2	18.6	22.5	18.8	23.2	23.4	27.2	25.9
Annual Energy DHW [GJ/yr]	54	54	54	54	54	54	52.9	52.9	52.9	54
Annual Energy Space Heating [GJ/yr]	23.2	23.4	22.2	18.6	22.5	18.8	23.2	23.4	27.2	25.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	1.3	1.3	1.3	1.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	182	182.2	180	176.4	180.3	176.6	180.9	181.1	184.9	184.7
Design Heating Load [W]	9538.1	9587.1	9818	9193.6	9867	9242.6	9538.1	9587.1	10162.5	9538.1
Annual Energy Electricity [kWh/yr]	35550.6	35619.8	35013.2	33992.2	35081.4	34055.5	35552.9	35622.1	36659.6	36297.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,967.09	$ 4,976.89	$ 4,891.05	$ 4,746.58	$ 4,900.7	$ 4,755.54	$ 4,967.42	$ 4,977.21	$ 5,124.02	$ 5,072.78
Annual Energy Natural Gas [m3/yr]	1449.5	1449.5	1449.5	1449.5	1449.5	1449.5	1420.4	1420.4	1420.4	1449.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 612.71	$ 612.71	$ 612.71	$ 625.26
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58702	58432	39280	58720	39010	58450	58703	58433	39263	58648
Upgrade Package List	Pkg2210101131	Pkg2210101031	Pkg2110101132	Pkg2210101132	Pkg2110101032	Pkg2210101032	Pkg2210101131	Pkg2210101031	Pkg2110101131	Pkg2210101121
GHGI [kg/m2]	6.98	6.99	6.97	6.95	6.97	6.95	6.86	6.86	6.89	7.00
% ICC	1.7%	1.7%	2.0%	2.2%	2.0%	2.2%	1.9%	1.9%	1.6%	1.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	20	20	20	20	20	20	20	20	20	20
Target Output: Better than Envelope (%)	10	10	10	10	10	10	10	10	10	10
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	14	14.2	13.5	11.2	13.6	11.4	14	14.2	16.5	15.7
Output: MEUI [kWh/(m2 * yr)]	48.1	48.3	47	44.7	47.1	44.9	47.5	47.6	49.9	49.8
Output: Better than ERS (%)	47.6	47.8	46	43.1	46.2	43.2	46.7	46.9	50	49.8
Output: Better than Envelope (%)	68.1	67.8	69.5	74.4	69.1	74.1	68.1	67.8	62.6	64.4
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13986	13917	14524	15544	14455	15481	13984	13915	12877	13239
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,972.04	$ 1,962.28	$ 2,047.81	$ 2,191.77	$ 2,038.2	$ 2,182.85	$ 1,971.72	$ 1,961.96	$ 1,815.67	$ 1,866.73
Annual savings in carbon tax for electricity [$/year]	$ 6.99	$ 6.96	$ 7.26	$ 7.77	$ 7.23	$ 7.74	$ 6.99	$ 6.96	$ 6.44	$ 6.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,979.03	$ 1,969.24	$ 2,055.08	$ 2,199.55	$ 2,045.42	$ 2,190.59	$ 1,978.71	$ 1,968.92	$ 1,822.11	$ 1,873.35
Annual savings in GHG from electricity savings [kg CO2e/year]	153.8	153.1	159.8	171	159	170.3	153.8	153.1	141.6	145.6
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	1.07	1.07	1.07	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ 9.87	$ 9.87	$ 9.87	$ .17
Annual savings in carbon tax for natural gas [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 2.46	$ 2.46	$ 2.46	$ .04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .22	$ .22	$ .22	$ .22	$ .22	$ .22	$ 12.34	$ 12.34	$ 12.34	$ .22
Annual savings in GHG from natural gas savings [kg CO2e/year]	1	1	1	1	1	1	54.8	54.8	54.8	1
Net Present Value [$]	$ 19,620.53	$ 19,442.32	$ 18,232.29	$ 18,192.47	$ 18,056.83	$ 18,029.6	$ 17,658.3	$ 17,480.1	$ 17,477.38	$ 17,400.7
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.93	4.67	4.67	4.93	4.67	4.93	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	5.28	3.87	5.28	5.28	5.28	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 8,412.62	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$.

Quad Vancouver Step4: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,477.84	$ 19,477.84	$ 21,677.84	$ 21,677.84	$ 22,249.52	$ 22,249.52	$ 22,389.49	$ 22,877.84	$ 22,877.84	$ 23,244.3
Net Present Value [$]	$ 189.48	$ 15.56	$ 1,420.58	$ 1,625.26	$ 1,064.92	$ 1,268.86	$ 3,129.33	$ 2,240.62	$ 2,445.3	$ 17,036.76
Incremental dollars per GHG saving	$ 6.94	$ 6.94	$ 7.72	$ 7.72	$ 7.91	$ 7.91	$ 7.98	$ 8.14	$ 8.14	$ 135.85
Auxiliary Energy Required Heating [GJ/yr]	34.9	35.2	34.6	34.9	33.8	34.1	35.5	34.4	34.7	36.6
Annual Energy DHW [GJ/yr]	28.1	28.1	27.5	27.5	28.1	28.1	28.1	27.2	27.2	54
Annual Energy Space Heating [GJ/yr]	34.9	35.2	34.6	34.9	33.8	34.1	35.5	34.4	34.7	13.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	1.3	1.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	167.8	168.1	167	167.3	165.7	166	168.4	166.4	166.7	176
Design Heating Load [W]	9538.1	9587.1	9538.1	9587.1	9818	9867	9588.9	9538.1	9587.1	11160.9
Annual Energy Electricity [kWh/yr]	46611.7	46691.4	46382.6	46462.1	46022.4	46101.6	46769.9	46235	46314.5	33888.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,532.24	$ 6,543.52	$ 6,499.82	$ 6,511.07	$ 6,448.85	$ 6,460.06	$ 6,554.63	$ 6,478.94	$ 6,490.19	$ 4,731.92
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	1449.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 625.26
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58705	58435	58706	58436	39283	39013	60865	58707	58437	39163
Upgrade Package List	Pkg2210101131	Pkg2210101031	Pkg2210101131	Pkg2210101031	Pkg2110101132	Pkg2110101032	Pkg2210201131	Pkg2210101131	Pkg2210101031	Pkg2110101111
GHGI [kg/m2]	1.14	1.14	1.13	1.13	1.12	1.13	1.14	1.13	1.13	6.94
% ICC	2.0%	2.0%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	40	40	40	40	40	40	40	40	40	40
Target Output: Better than Envelope (%)	20	20	20	20	20	20	20	20	20	20
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	21.1	21.3	21	21.1	20.5	20.6	21.5	20.9	21	22.2
Output: MEUI [kWh/(m2 * yr)]	39.6	39.7	39.1	39.2	38.3	38.5	39.9	38.7	38.9	44.2
Output: Better than ERS (%)	36.1	36.3	35.4	35.7	34.4	34.6	36.6	35	35.2	42.7
Output: Better than Envelope (%)	52	51.6	52.4	52	53.5	53.1	51.2	52.7	52.3	49.7
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2925	2845	3154	3075	3514	3435	2767	3302	3222	15648
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 412.42	$ 401.19	$ 444.73	$ 433.52	$ 495.52	$ 484.35	$ 390.12	$ 465.54	$ 454.33	$ 2,206.38
Annual savings in carbon tax for electricity [$/year]	$ 1.46	$ 1.42	$ 1.58	$ 1.54	$ 1.76	$ 1.72	$ 1.38	$ 1.65	$ 1.61	$ 7.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 413.89	$ 402.61	$ 446.31	$ 435.06	$ 497.27	$ 486.07	$ 391.5	$ 467.19	$ 455.94	$ 2,214.21
Annual savings in GHG from electricity savings [kg CO2e/year]	32.2	31.3	34.7	33.8	38.7	37.8	30.4	36.3	35.4	172.1
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ .17
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ .04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ .22
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	1
Net Present Value [$]	$ 189.48	$ 15.56	$ 1,420.58	$ 1,625.26	$ 1,064.92	$ 1,268.86	$ 3,129.33	$ 2,240.62	$ 2,445.3	$ 17,036.76
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93	4.67	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$.
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,911.65	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	BC ASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$ 3,400.	$ 3,400.	$.

Quad Vancouver Step4: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 19,477.84	$ 19,477.84	$ 21,677.84	$ 21,677.84	$ 22,249.52	$ 22,249.52	$ 22,389.49	$ 22,877.84	$ 22,877.84	$ 23,310.69
Net Present Value [$]	$ 189.48	$ 15.56	$ 1,420.58	$ 1,625.26	$ 1,064.92	$ 1,268.86	$ 3,129.33	$ 2,240.62	$ 2,445.3	$ 3,591.88
Incremental dollars per GHG saving	$ 6.94	$ 6.94	$ 7.72	$ 7.72	$ 7.91	$ 7.91	$ 7.98	$ 8.14	$ 8.14	$ 8.31
Auxiliary Energy Required Heating [GJ/yr]	34.9	35.2	34.6	34.9	33.8	34.1	35.5	34.4	34.7	34.8
Annual Energy DHW [GJ/yr]	28.1	28.1	27.5	27.5	28.1	28.1	28.1	27.2	27.2	28.1
Annual Energy Space Heating [GJ/yr]	34.9	35.2	34.6	34.9	33.8	34.1	35.5	34.4	34.7	34.8
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	1.3	1.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	167.8	168.1	167	167.3	165.7	166	168.4	166.4	166.7	167.7
Design Heating Load [W]	9538.1	9587.1	9538.1	9587.1	9818	9867	9588.9	9538.1	9587.1	9534.9
Annual Energy Electricity [kWh/yr]	46611.7	46691.4	46382.6	46462.1	46022.4	46101.6	46769.9	46235	46314.5	46591.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,532.24	$ 6,543.52	$ 6,499.82	$ 6,511.07	$ 6,448.85	$ 6,460.06	$ 6,554.63	$ 6,478.94	$ 6,490.19	$ 6,529.41
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58705	58435	58706	58436	39283	39013	60865	58707	58437	66697
Upgrade Package List	Pkg2210101131	Pkg2210101031	Pkg2210101131	Pkg2210101031	Pkg2110101132	Pkg2110101032	Pkg2210201131	Pkg2210101131	Pkg2210101031	Pkg2210301131
GHGI [kg/m2]	1.14	1.14	1.13	1.13	1.12	1.13	1.14	1.13	1.13	1.14
% ICC	2.0%	2.0%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	40	40	40	40	40	40	40	40	40	40
Target Output: Better than Envelope (%)	20	20	20	20	20	20	20	20	20	20
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	21.1	21.3	21	21.1	20.5	20.6	21.5	20.9	21	21.1
Output: MEUI [kWh/(m2 * yr)]	39.6	39.7	39.1	39.2	38.3	38.5	39.9	38.7	38.9	39.5
Output: Better than ERS (%)	36.1	36.3	35.4	35.7	34.4	34.6	36.6	35	35.2	36
Output: Better than Envelope (%)	52	51.6	52.4	52	53.5	53.1	51.2	52.7	52.3	52.1
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2925	2845	3154	3075	3514	3435	2767	3302	3222	2945
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 412.42	$ 401.19	$ 444.73	$ 433.52	$ 495.52	$ 484.35	$ 390.12	$ 465.54	$ 454.33	$ 415.24
Annual savings in carbon tax for electricity [$/year]	$ 1.46	$ 1.42	$ 1.58	$ 1.54	$ 1.76	$ 1.72	$ 1.38	$ 1.65	$ 1.61	$ 1.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 413.89	$ 402.61	$ 446.31	$ 435.06	$ 497.27	$ 486.07	$ 391.5	$ 467.19	$ 455.94	$ 416.72
Annual savings in GHG from electricity savings [kg CO2e/year]	32.2	31.3	34.7	33.8	38.7	37.8	30.4	36.3	35.4	32.4
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4
Net Present Value [$]	$ 189.48	$ 15.56	$ 1,420.58	$ 1,625.26	$ 1,064.92	$ 1,268.86	$ 3,129.33	$ 2,240.62	$ 2,445.3	$ 3,591.88
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93	4.67	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	NA	NA	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,911.65	$.	$.	$ 3,832.85
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$ 3,400.	$ 3,400.	$.

Quad Vancouver Step4: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 23,244.3	$ 23,244.3	$ 25,912.62	$ 25,912.62	$ 26,313.52	$ 26,313.52	$ 26,610.54	$ 26,610.54	$ 25,444.3	$ 25,444.3
Net Present Value [$]	$ 17,036.76	$ 16,965.19	$ 15,576.97	$ 15,512.52	$ 15,413.43	$ 15,325.79	$ 15,235.64	$ 15,088.48	$ 15,078.19	$ 15,006.62
Incremental dollars per GHG saving	$ 135.85	$ 136.09	$ 146.98	$ 147.23	$ 148.41	$ 148.75	$ 149.67	$ 150.17	$ 112.14	$ 112.29
Auxiliary Energy Required Heating [GJ/yr]	36.6	36.9	32.2	32.4	27.2	27.4	30	30.3	36.6	36.9
Annual Energy DHW [GJ/yr]	54	54	54	54	54	54	54	54	52.9	52.9
Annual Energy Space Heating [GJ/yr]	13.9	14	12.2	12.3	10.6	10.7	11.5	11.7	13.9	14
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	176	176.1	174.3	174.4	174	174.1	173.8	174	174.9	175
Design Heating Load [W]	11160.9	11210	10536.5	10585.6	10402.7	10451.7	10402.7	10451.7	11160.9	11210
Annual Energy Electricity [kWh/yr]	33888.6	33916.4	33419.2	33444.2	33327	33361	33280.7	33337.8	33889.5	33917.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 4,731.92	$ 4,735.86	$ 4,665.5	$ 4,669.04	$ 4,652.46	$ 4,657.27	$ 4,645.9	$ 4,653.98	$ 4,732.05	$ 4,735.98
Annual Energy Natural Gas [m3/yr]	1449.5	1449.5	1449.5	1449.5	1449.5	1449.5	1449.5	1449.5	1420.4	1420.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 625.26	$ 612.71	$ 612.71
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	39163	38893	58603	58333	39271	39001	39217	38947	39164	38894
Upgrade Package List	Pkg2110101111	Pkg2110101011	Pkg2210101111	Pkg2210101011	Pkg2110101131	Pkg2110101031	Pkg2110101121	Pkg2110101021	Pkg2110101111	Pkg2110101011
GHGI [kg/m2]	6.94	6.94	6.93	6.93	6.93	6.93	6.93	6.93	6.82	6.82
% ICC	2.4%	2.4%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.6%	2.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	40	40	40	40	40	40	40	40	40	40
Target Output: Better than Envelope (%)	20	20	20	20	20	20	20	20	20	20
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	22.2	22.4	19.5	19.6	16.5	16.6	18.2	18.4	22.2	22.4
Output: MEUI [kWh/(m2 * yr)]	44.2	44.3	43.2	43.3	42.9	42.9	42.9	43	43.6	43.7
Output: Better than ERS (%)	42.7	42.8	41.4	41.4	41.1	41.2	41	41.1	41.8	41.9
Output: Better than Envelope (%)	49.7	49.2	55.7	55.4	62.6	62.3	58.7	58.3	49.7	49.2
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	15648	15620	16118	16092	16210	16176	16256	16199	15647	15619
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,206.38	$ 2,202.46	$ 2,272.57	$ 2,269.04	$ 2,285.57	$ 2,280.77	$ 2,292.1	$ 2,284.04	$ 2,206.26	$ 2,202.34
Annual savings in carbon tax for electricity [$/year]	$ 7.82	$ 7.81	$ 8.06	$ 8.05	$ 8.1	$ 8.09	$ 8.13	$ 8.1	$ 7.82	$ 7.81
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,214.21	$ 2,210.27	$ 2,280.63	$ 2,277.09	$ 2,293.67	$ 2,288.86	$ 2,300.22	$ 2,292.14	$ 2,214.08	$ 2,210.15
Annual savings in GHG from electricity savings [kg CO2e/year]	172.1	171.8	177.3	177	178.3	177.9	178.8	178.2	172.1	171.8
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1.07	1.07
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ .17	$ 9.87	$ 9.87
Annual savings in carbon tax for natural gas [$/year]	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ .04	$ 2.46	$ 2.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .22	$ .22	$ .22	$ .22	$ .22	$ .22	$ .22	$ .22	$ 12.34	$ 12.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	1	1	1	1	1	1	1	1	54.8	54.8
Net Present Value [$]	$ 17,036.76	$ 16,965.19	$ 15,576.97	$ 15,512.52	$ 15,413.43	$ 15,325.79	$ 15,235.64	$ 15,088.48	$ 15,078.19	$ 15,006.62
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.

Quad Vancouver Step5: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 41,429.49	$ 41,635.12	$ 42,350.69	$ 42,556.32	$ 42,942.89	$ 43,148.52
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,436.5	$ 7,419.38
Incremental dollars per GHG saving	$ 14.42	$ 14.49	$ 14.74	$ 14.81	$ 14.94	$ 15.01
Auxiliary Energy Required Heating [GJ/yr]	28	27.4	27.4	26.8	26.9	26.2
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1
Annual Energy Space Heating [GJ/yr]	10.6	10.5	10.4	10.3	10.3	10
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	146	145.8	145.8	145.6	145.7	145.3
Design Heating Load [W]	9068.6	8958.7	9014.5	8904.6	8964	8854.1
Annual Energy Electricity [kWh/yr]	40544	40507.3	40491.1	40454.6	40459.3	40372.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,673.66	$ 5,668.47	$ 5,666.18	$ 5,661.01	$ 5,661.68	$ 5,649.44
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	169792	170008	173680	173896	177568	177784
Upgrade Package List	Pkg3210211132	Pkg3210211232	Pkg3210311132	Pkg3210311232	Pkg3210411132	Pkg3210411232
GHGI [kg/m2]	0.99	0.99	0.99	0.99	0.99	0.99
% ICC	4.2%	4.2%	4.3%	4.3%	4.4%	4.4%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	50	50	50	50	50	50
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17	16.6	16.6	16.2	16.3	15.9
Output: MEUI [kWh/(m2 * yr)]	26	26	25.9	25.9	25.9	25.7
Output: Better than ERS (%)	18.4	18.2	18.2	18.1	18.2	17.8
Output: Better than Envelope (%)	61.5	62.3	62.3	63.1	63	64
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	8993	9029	9046	9082	9077	9164
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,267.97	$ 1,273.15	$ 1,275.43	$ 1,280.58	$ 1,279.91	$ 1,292.11
Annual savings in carbon tax for electricity [$/year]	$ 4.5	$ 4.51	$ 4.52	$ 4.54	$ 4.54	$ 4.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,272.47	$ 1,277.66	$ 1,279.95	$ 1,285.12	$ 1,284.45	$ 1,296.69
Annual savings in GHG from electricity savings [kg CO2e/year]	98.9	99.3	99.5	99.9	99.9	100.8
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,436.5	$ 7,419.38
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	4.93	5.64	4.93	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$.	$ 205.63	$.	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 4,425.05
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

Quad Vancouver Step5: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 41,429.49	$ 41,635.12	$ 42,350.69	$ 42,556.32	$ 42,942.89	$ 43,148.52
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,436.5	$ 7,419.38
Incremental dollars per GHG saving	$ 14.42	$ 14.49	$ 14.74	$ 14.81	$ 14.94	$ 15.01
Auxiliary Energy Required Heating [GJ/yr]	28	27.4	27.4	26.8	26.9	26.2
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1
Annual Energy Space Heating [GJ/yr]	10.6	10.5	10.4	10.3	10.3	10
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	146	145.8	145.8	145.6	145.7	145.3
Design Heating Load [W]	9068.6	8958.7	9014.5	8904.6	8964	8854.1
Annual Energy Electricity [kWh/yr]	40544	40507.3	40491.1	40454.6	40459.3	40372.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,673.66	$ 5,668.47	$ 5,666.18	$ 5,661.01	$ 5,661.68	$ 5,649.44
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	169792	170008	173680	173896	177568	177784
Upgrade Package List	Pkg3210211132	Pkg3210211232	Pkg3210311132	Pkg3210311232	Pkg3210411132	Pkg3210411232
GHGI [kg/m2]	0.99	0.99	0.99	0.99	0.99	0.99
% ICC	4.2%	4.2%	4.3%	4.3%	4.4%	4.4%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	50	50	50	50	50	50
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17	16.6	16.6	16.2	16.3	15.9
Output: MEUI [kWh/(m2 * yr)]	26	26	25.9	25.9	25.9	25.7
Output: Better than ERS (%)	18.4	18.2	18.2	18.1	18.2	17.8
Output: Better than Envelope (%)	61.5	62.3	62.3	63.1	63	64
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	8993	9029	9046	9082	9077	9164
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,267.97	$ 1,273.15	$ 1,275.43	$ 1,280.58	$ 1,279.91	$ 1,292.11
Annual savings in carbon tax for electricity [$/year]	$ 4.5	$ 4.51	$ 4.52	$ 4.54	$ 4.54	$ 4.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,272.47	$ 1,277.66	$ 1,279.95	$ 1,285.12	$ 1,284.45	$ 1,296.69
Annual savings in GHG from electricity savings [kg CO2e/year]	98.9	99.3	99.5	99.9	99.9	100.8
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,436.5	$ 7,419.38
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	4.93	5.64	4.93	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$.	$ 205.63	$.	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 4,425.05
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

Quad Vancouver Step5: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 41,429.49	$ 41,635.12	$ 42,350.69	$ 42,556.32	$ 43,208.37	$ 43,414.
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,168.28	$ 7,220.18
Incremental dollars per GHG saving	$ 14.42	$ 14.49	$ 14.74	$ 14.81	$ 15.02	$ 15.09
Auxiliary Energy Required Heating [GJ/yr]	28	27.4	27.4	26.8	25.1	24.5
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1
Annual Energy Space Heating [GJ/yr]	10.6	10.5	10.4	10.3	9.6	9.4
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	146	145.8	145.8	145.6	144.9	144.7
Design Heating Load [W]	9068.6	8958.7	9014.5	8904.6	8639.3	8529.4
Annual Energy Electricity [kWh/yr]	40544	40507.3	40491.1	40454.6	40252	40192.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,673.66	$ 5,668.47	$ 5,666.18	$ 5,661.01	$ 5,632.34	$ 5,623.9
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	169792	170008	173680	173896	221632	221848
Upgrade Package List	Pkg3210211132	Pkg3210211232	Pkg3210311132	Pkg3210311232	Pkg3310211132	Pkg3310211232
GHGI [kg/m2]	0.99	0.99	0.99	0.99	0.98	0.98
% ICC	4.2%	4.2%	4.3%	4.3%	4.4%	4.4%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	50	50	50	50	50	50
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17	16.6	16.6	16.2	15.2	14.8
Output: MEUI [kWh/(m2 * yr)]	26	26	25.9	25.9	25.4	25.3
Output: Better than ERS (%)	18.4	18.2	18.2	18.1	17.5	17.4
Output: Better than Envelope (%)	61.5	62.3	62.3	63.1	65.5	66.3
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	8993	9029	9046	9082	9285	9344
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,267.97	$ 1,273.15	$ 1,275.43	$ 1,280.58	$ 1,309.14	$ 1,317.56
Annual savings in carbon tax for electricity [$/year]	$ 4.5	$ 4.51	$ 4.52	$ 4.54	$ 4.64	$ 4.67
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,272.47	$ 1,277.66	$ 1,279.95	$ 1,285.12	$ 1,313.79	$ 1,322.23
Annual savings in GHG from electricity savings [kg CO2e/year]	98.9	99.3	99.5	99.9	102.1	102.8
Annual savings in natural gas [m3/year]	53.99	53.99	53.99	53.99	53.99	53.99
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2	$ 500.2
Annual savings in carbon tax for natural gas [$/year]	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85	$ 124.85
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05	$ 625.05
Annual savings in GHG from natural gas savings [kg CO2e/year]	2774.4	2774.4	2774.4	2774.4	2774.4	2774.4
Net Present Value [$]	$ 6,141.11	$ 6,252.16	$ 6,926.1	$ 7,037.7	$ 7,168.28	$ 7,220.18
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	4.93	5.64	4.93	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$.	$ 205.63	$.	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 2,911.65	$ 2,911.65
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

QUADPLEX Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,713.52	$ 13,713.52	$ 13,740.3	$ 13,740.3	$ 14,010.54	$ 14,010.54	$ 15,381.84	$ 15,381.84	$ 15,408.62	$ 15,408.62
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 14,714.61	$ 14,714.61	$ 14,743.34	$ 14,743.34	$ 15,033.31	$ 15,033.31	$ 16,504.71	$ 16,504.71	$ 16,533.45	$ 16,533.45
Net Present Value [$]	$ 28,746.46	$ 28,499.24	$ 2,149.47	$ 1,877.05	$ 25,964.09	$ 25,709.93	$ 25,728.83	$ 25,481.98	$ 847.52	$ 1,119.39
Incremental dollars per GHG saving	$ 76.06	$ 76.48	$ 4.93	$ 4.93	$ 82.56	$ 83.1	$ 88.1	$ 88.66	$ 5.53	$ 5.54
Auxiliary Energy Required Heating [GJ/yr]	45.7	46	71.7	72.1	49.1	49.5	47.5	47.9	73.6	73.9
Annual Energy DHW [GJ/yr]	54	54	28.1	28.1	54	54	54	54	28.1	28.1
Annual Energy Space Heating [GJ/yr]	45.7	46	71.7	72.1	49.1	49.5	47.5	47.9	73.6	73.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	204.4	204.8	204.6	205	207.9	208.3	206.3	206.7	206.5	206.8
Design Heating Load [W]	13195.2	13257.8	14162.6	14225.2	13195.2	13257.8	13829	13891.6	14796.5	14859.1
Annual Energy Electricity [kWh/yr]	41796.5	41892.5	56832.7	56938.5	42761.9	42860.6	42320.6	42416.5	57348.8	57454.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,850.89	$ 5,864.47	$ 7,978.51	$ 7,993.48	$ 5,987.49	$ 6,001.46	$ 5,925.05	$ 5,938.62	$ 8,051.54	$ 8,066.48
Annual Energy Natural Gas [m3/yr]	1449.3	1449.3	0	0	1449.3	1449.3	1449.3	1449.3	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 625.18	$ 625.18	$.	$.	$ 625.18	$ 625.18	$ 625.18	$ 625.18	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39262	38992	39157	38887	39208	38938	19822	19552	19717	19447
Upgrade Package List	Pkg2110101131	Pkg2110101031	Pkg2110101111	Pkg2110101011	Pkg2110101121	Pkg2110101021	Pkg1210101131	Pkg1210101031	Pkg1210101111	Pkg1210101011
GHGI [kg/m2]	7.06	7.06	1.36	1.37	7.08	7.08	7.07	7.07	1.38	1.38
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	27.7	27.9	43.4	43.7	29.8	30	28.8	29	44.6	44.8
Output: MEUI [kWh/(m2 * yr)]	61.8	62	61.9	62.1	63.9	64.1	62.9	63.1	63	63.2
Output: Better than ERS (%)	4070.0%	4090.0%	4080.0%	4110.0%	4310.0%	4340.0%	4200.0%	4230.0%	4210.0%	4230.0%
Output: Better than Envelope (%)	5120.0%	5090.0%	2340.0%	2300.0%	4750.0%	4710.0%	4930.0%	4880.0%	2140.0%	2100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16495	16399	1459	1353	15529	15431	15971	15875	942	837
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,325.77	$ 2,312.23	$ 205.66	$ 190.74	$ 2,189.65	$ 2,175.73	$ 2,251.87	$ 2,238.35	$ 132.89	$ 118.
Annual savings in carbon tax for electricity [$/year]	$ 8.25	$ 8.2	$ .73	$ .68	$ 7.76	$ 7.72	$ 7.99	$ 7.94	$ .47	$ .42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,334.01	$ 2,320.43	$ 206.39	$ 191.42	$ 2,197.41	$ 2,183.44	$ 2,259.85	$ 2,246.28	$ 133.36	$ 118.42
Annual savings in GHG from electricity savings [kg CO2e/year]	181.4	180.4	16	14.9	170.8	169.7	175.7	174.6	10.4	9.2
Annual savings in natural gas [m3/year]	0.02	0.02	53.98	53.98	0.02	0.02	0.02	0.02	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ 500.1	$ 500.1	$ .21	$ .21	$ .21	$ .21	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ 124.82	$ 124.82	$ .05	$ .05	$ .05	$ .05	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ 624.92	$ 624.92	$ .26	$ .26	$ .26	$ .26	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	2773.8	2773.8	1.1	1.1	1.1	1.1	2773.8	2773.8
Net Present Value [$]	$ 28,746.46	$ 28,499.24	$ 2,149.47	$ 1,877.05	$ 25,964.09	$ 25,709.93	$ 25,728.83	$ 25,481.98	$ 847.52	$ 1,119.39
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 13,740.3	$ 13,740.3	$ 15,408.62	$ 15,408.62	$ 15,809.52	$ 15,809.52	$ 15,940.3	$ 15,940.3	$ 16,106.54	$ 16,106.54
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 14,743.34	$ 14,743.34	$ 16,533.45	$ 16,533.45	$ 16,963.61	$ 16,963.61	$ 17,103.94	$ 17,103.94	$ 17,282.32	$ 17,282.32
Net Present Value [$]	$ 2,149.47	$ 1,877.05	$ 847.52	$ 1,119.39	$ 3,858.85	$ 3,594.65	$ 572.27	$ 299.85	$ 573.09	$ 303.23
Incremental dollars per GHG saving	$ 4.93	$ 4.93	$ 5.53	$ 5.54	$ 5.63	$ 5.64	$ 5.71	$ 5.71	$ 5.77	$ 5.77
Auxiliary Energy Required Heating [GJ/yr]	71.7	72.1	73.6	73.9	66.4	66.8	71.4	71.8	70.6	71
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	28.1	28.1	27.5	27.5	28.1	28.1
Annual Energy Space Heating [GJ/yr]	71.7	72.1	73.6	73.9	66.4	66.8	71.4	71.8	70.6	71
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	204.6	205	206.5	206.8	199.3	199.7	203.7	204.1	203.5	203.9
Design Heating Load [W]	14162.6	14225.2	14796.5	14859.1	14625.7	14688.3	14162.6	14225.2	14625.7	14688.3
Annual Energy Electricity [kWh/yr]	56832.7	56938.5	57348.8	57454.4	55365	55467.6	56590.8	56696.6	56525.9	56630.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,978.51	$ 7,993.48	$ 8,051.54	$ 8,066.48	$ 7,770.83	$ 7,785.35	$ 7,944.28	$ 7,959.25	$ 7,935.1	$ 7,949.93
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39157	38887	19717	19447	385	115	39158	38888	331	61
Upgrade Package List	Pkg2110101111	Pkg2110101011	Pkg1210101111	Pkg1210101011	Pkg1110101131	Pkg1110101031	Pkg2110101111	Pkg2110101011	Pkg1110101121	Pkg1110101021
GHGI [kg/m2]	1.36	1.37	1.38	1.38	1.33	1.33	1.36	1.36	1.36	1.36
% ICC	1.4%	1.4%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	43.4	43.7	44.6	44.8	40.2	40.5	43.2	43.5	42.8	43
Output: MEUI [kWh/(m2 * yr)]	61.9	62.1	63	63.2	58.7	58.9	61.3	61.6	61.2	61.4
Output: Better than ERS (%)	4080.0%	4110.0%	4210.0%	4230.0%	3720.0%	3740.0%	4020.0%	4050.0%	4010.0%	4030.0%
Output: Better than Envelope (%)	2340.0%	2300.0%	2140.0%	2100.0%	2910.0%	2860.0%	2370.0%	2330.0%	2460.0%	2410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	1459	1353	942	837	2926	2824	1700	1595	1765	1661
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 205.66	$ 190.74	$ 132.89	$ 118.	$ 412.61	$ 398.14	$ 239.77	$ 224.85	$ 248.92	$ 234.14
Annual savings in carbon tax for electricity [$/year]	$ .73	$ .68	$ .47	$ .42	$ 1.46	$ 1.41	$ .85	$ .8	$ .88	$ .83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 206.39	$ 191.42	$ 133.36	$ 118.42	$ 414.07	$ 399.55	$ 240.62	$ 225.65	$ 249.8	$ 234.97
Annual savings in GHG from electricity savings [kg CO2e/year]	16	14.9	10.4	9.2	32.2	31.1	18.7	17.5	19.4	18.3
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 2,149.47	$ 1,877.05	$ 847.52	$ 1,119.39	$ 3,858.85	$ 3,594.65	$ 572.27	$ 299.85	$ 573.09	$ 303.23
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,366.24	$ 3,366.24
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$.	$.

QUADPLEX Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,381.84	$ 21,821.84	$ 16,381.84	$ 21,821.84	$ 19,421.84	$ 19,421.84	$ 13,713.52	$ 19,153.52	$ 13,713.52	$ 19,153.52
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,577.71	$ 23,414.83	$ 17,577.71	$ 23,414.83	$ 20,839.63	$ 20,839.63	$ 14,714.61	$ 20,551.73	$ 14,714.61	$ 20,551.73
Net Present Value [$]	$ 29,858.92	$ 29,640.49	$ 29,617.36	$ 29,409.7	$ 29,182.53	$ 28,955.57	$ 28,746.46	$ 28,709.15	$ 28,499.24	$ 28,469.78
Incremental dollars per GHG saving	$ 83.37	$ 99.73	$ 83.8	$ 100.19	$ 999,999.	$ 999,999.	$ 76.06	$ 94.17	$ 76.48	$ 94.63
Auxiliary Energy Required Heating [GJ/yr]	40.4	34.1	40.7	34.4	32.8	33.1	45.7	39.1	46	39.4
Annual Energy DHW [GJ/yr]	54	54	54	54	70.8	70.8	54	54	54	54
Annual Energy Space Heating [GJ/yr]	40.4	34.1	40.7	34.4	32.8	33.1	45.7	39.1	46	39.4
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	1.3	2.3	1.3	1.3	1.3	2.3	1.3	2.3	1.3
Total Energy [GJ/yr]	199.2	191.9	199.5	192.2	207.4	207.7	204.4	196.9	204.8	197.2
Design Heating Load [W]	12398.5	11959	12461.1	12021.6	12164.5	12227.1	13195.2	12755.6	13257.8	12818.2
Annual Energy Electricity [kWh/yr]	40327.9	38299.7	40421.7	38389.3	37936.3	38024.4	41796.5	39697.9	41892.5	39790.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,643.08	$ 5,356.09	$ 5,656.36	$ 5,368.77	$ 5,304.67	$ 5,317.14	$ 5,850.89	$ 5,553.94	$ 5,864.47	$ 5,567.1
Annual Energy Natural Gas [m3/yr]	1449.3	1449.3	1449.3	1449.3	1902.2	1902.2	1449.3	1449.3	1449.3	1449.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 625.18	$ 625.18	$ 625.18	$ 625.18	$ 820.54	$ 820.54	$ 625.18	$ 625.18	$ 625.18	$ 625.18
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58702	58720	58432	58450	58717	58447	39262	39280	38992	39010
Upgrade Package List	Pkg2210101131	Pkg2210101132	Pkg2210101031	Pkg2210101032	Pkg2210101132	Pkg2210101032	Pkg2110101131	Pkg2110101132	Pkg2110101031	Pkg2110101032
GHGI [kg/m2]	7.02	6.97	7.02	6.97	8.85	8.86	7.06	7	7.06	7.01
% ICC	1.7%	2.2%	1.7%	2.2%	2.0%	2.0%	1.4%	2.0%	1.4%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	24.5	20.6	24.7	20.8	19.8	20	27.7	23.7	27.9	23.9
Output: MEUI [kWh/(m2 * yr)]	58.6	54.1	58.8	54.3	63.6	63.8	61.8	57.2	62	57.4
Output: Better than ERS (%)	3710.0%	3210.0%	3730.0%	3230.0%	4270.0%	4290.0%	4070.0%	3550.0%	4090.0%	3570.0%
Output: Better than Envelope (%)	5680.0%	6360.0%	5650.0%	6320.0%	6500.0%	6460.0%	5120.0%	5820.0%	5090.0%	5790.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17963	19992	17870	19902	20355	20267	16495	18593	16399	18500
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,532.84	$ 2,818.82	$ 2,519.61	$ 2,806.18	$ 2,870.06	$ 2,857.63	$ 2,325.77	$ 2,621.67	$ 2,312.23	$ 2,608.56
Annual savings in carbon tax for electricity [$/year]	$ 8.98	$ 10.	$ 8.93	$ 9.95	$ 10.18	$ 10.13	$ 8.25	$ 9.3	$ 8.2	$ 9.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,541.82	$ 2,828.81	$ 2,528.55	$ 2,816.13	$ 2,880.23	$ 2,867.77	$ 2,334.01	$ 2,630.97	$ 2,320.43	$ 2,617.81
Annual savings in GHG from electricity savings [kg CO2e/year]	197.6	219.9	196.6	218.9	223.9	222.9	181.4	204.5	180.4	203.5
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	16.9	16.9	0.02	0.02	0.02	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ 156.55	$ 156.55	$ .21	$ .21	$ .21	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ 39.07	$ 39.07	$ .05	$ .05	$ .05	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ 195.62	$ 195.62	$ .26	$ .26	$ .26	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	868.3	868.3	1.1	1.1	1.1	1.1
Net Present Value [$]	$ 29,858.92	$ 29,640.49	$ 29,617.36	$ 29,409.7	$ 29,182.53	$ 28,955.57	$ 28,746.46	$ 28,709.15	$ 28,499.24	$ 28,469.78
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.93	4.67	4.67	4.93	4.67	4.93	4.93	4.67	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	HRV sre 60	NA	HRV sre 60	HRV sre 60	HRV sre 60	NA	HRV sre 60	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$ 5,440.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$.	$ 5,440.	$.	$ 5,440.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$.	$.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 22,249.52	$ 22,249.52	$ 22,877.84	$ 22,877.84	$ 24,009.52	$ 24,009.52	$ 24,449.52	$ 24,449.52	$ 24,917.84	$ 24,917.84
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 23,873.73	$ 23,873.73	$ 24,547.92	$ 24,547.92	$ 25,762.21	$ 25,762.21	$ 26,234.33	$ 26,234.33	$ 26,736.84	$ 26,736.84
Net Present Value [$]	$ 8,688.91	$ 8,431.83	$ 7,331.52	$ 7,073.9	$ 7,405.27	$ 7,148.92	$ 7,087.78	$ 6,831.07	$ 10,002.58	$ 9,749.15
Incremental dollars per GHG saving	$ 7.8	$ 7.8	$ 8.02	$ 8.03	$ 8.41	$ 8.41	$ 8.56	$ 8.56	$ 8.68	$ 8.68
Auxiliary Energy Required Heating [GJ/yr]	51.6	52	52.6	52.9	51	51.3	51.4	51.7	46.1	46.4
Annual Energy DHW [GJ/yr]	28.1	28.1	27.2	27.2	28.1	28.1	27.5	27.5	28.1	28.1
Annual Energy Space Heating [GJ/yr]	51.6	52	52.6	52.9	51	51.3	51.4	51.7	46.1	46.4
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	2.3	2.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	183.6	183.9	184.6	184.9	182.9	183.2	182.7	183.1	178	178.3
Design Heating Load [W]	12755.6	12818.2	12398.5	12461.1	12643.7	12706.3	12755.6	12818.2	11959	12021.6
Annual Energy Electricity [kWh/yr]	50987.3	51087.2	51270.5	51370.6	50802.3	50901.9	50754.7	50854.4	49440.6	49539
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,151.39	$ 7,165.52	$ 7,191.46	$ 7,205.62	$ 7,125.21	$ 7,139.3	$ 7,118.48	$ 7,132.58	$ 6,932.53	$ 6,946.45
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	39283	39013	58707	58437	39301	39031	39284	39014	58723	58453
Upgrade Package List	Pkg2110101132	Pkg2110101032	Pkg2210101131	Pkg2210101031	Pkg2110101133	Pkg2110101033	Pkg2110101132	Pkg2110101032	Pkg2210101132	Pkg2210101032
GHGI [kg/m2]	1.22	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.19	1.19
% ICC	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	31.3	31.5	31.9	32.1	30.9	31.1	31.1	31.3	27.9	28.1
Output: MEUI [kWh/(m2 * yr)]	49.1	49.3	49.7	49.9	48.7	48.9	48.6	48.8	45.7	46
Output: Better than ERS (%)	2640.0%	2660.0%	2700.0%	2730.0%	2590.0%	2610.0%	2570.0%	2600.0%	2250.0%	2270.0%
Output: Better than Envelope (%)	4490.0%	4440.0%	4380.0%	4350.0%	4550.0%	4520.0%	4510.0%	4480.0%	5070.0%	5040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7304	7204	7021	6921	7489	7389	7537	7437	8851	8752
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,029.86	$ 1,015.78	$ 989.93	$ 975.82	$ 1,055.95	$ 1,041.91	$ 1,062.66	$ 1,048.6	$ 1,247.95	$ 1,234.07
Annual savings in carbon tax for electricity [$/year]	$ 3.65	$ 3.6	$ 3.51	$ 3.46	$ 3.74	$ 3.69	$ 3.77	$ 3.72	$ 4.43	$ 4.38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,033.52	$ 1,019.38	$ 993.44	$ 979.28	$ 1,059.69	$ 1,045.6	$ 1,066.43	$ 1,052.32	$ 1,252.37	$ 1,238.45
Annual savings in GHG from electricity savings [kg CO2e/year]	80.3	79.2	77.2	76.1	82.4	81.3	82.9	81.8	97.4	96.3
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 8,688.91	$ 8,431.83	$ 7,331.52	$ 7,073.9	$ 7,405.27	$ 7,148.92	$ 7,087.78	$ 6,831.07	$ 10,002.58	$ 9,749.15
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ -	$ -	$ 7,200.	$ 7,200.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$ -	$ -	$ 3,400.	$ 3,400.	$ -	$ -	$ 2,200.	$ 2,200.	$ -	$ -

QUADPLEX Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 22,249.52	$ 22,249.52	$ 22,877.84	$ 22,877.84	$ 24,009.52	$ 24,009.52	$ 24,449.52	$ 24,449.52	$ 24,917.84	$ 24,917.84
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 23,873.73	$ 23,873.73	$ 24,547.92	$ 24,547.92	$ 25,762.21	$ 25,762.21	$ 26,234.33	$ 26,234.33	$ 26,736.84	$ 26,736.84
Net Present Value [$]	$ 8,688.91	$ 8,431.83	$ 7,331.52	$ 7,073.9	$ 7,405.27	$ 7,148.92	$ 7,087.78	$ 6,831.07	$ 10,002.58	$ 9,749.15
Incremental dollars per GHG saving	$ 7.8	$ 7.8	$ 8.02	$ 8.03	$ 8.41	$ 8.41	$ 8.56	$ 8.56	$ 8.68	$ 8.68
Auxiliary Energy Required Heating [GJ/yr]	51.6	52	52.6	52.9	51	51.3	51.4	51.7	46.1	46.4
Annual Energy DHW [GJ/yr]	28.1	28.1	27.2	27.2	28.1	28.1	27.5	27.5	28.1	28.1
Annual Energy Space Heating [GJ/yr]	51.6	52	52.6	52.9	51	51.3	51.4	51.7	46.1	46.4
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	2.3	2.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	183.6	183.9	184.6	184.9	182.9	183.2	182.7	183.1	178	178.3
Design Heating Load [W]	12755.6	12818.2	12398.5	12461.1	12643.7	12706.3	12755.6	12818.2	11959	12021.6
Annual Energy Electricity [kWh/yr]	50987.3	51087.2	51270.5	51370.6	50802.3	50901.9	50754.7	50854.4	49440.6	49539
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,151.39	$ 7,165.52	$ 7,191.46	$ 7,205.62	$ 7,125.21	$ 7,139.3	$ 7,118.48	$ 7,132.58	$ 6,932.53	$ 6,946.45
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	39283	39013	58707	58437	39301	39031	39284	39014	58723	58453
Upgrade Package List	Pkg2110101132	Pkg2110101032	Pkg2210101131	Pkg2210101031	Pkg2110101133	Pkg2110101033	Pkg2110101132	Pkg2110101032	Pkg2210101132	Pkg2210101032
GHGI [kg/m2]	1.22	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.19	1.19
% ICC	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	31.3	31.5	31.9	32.1	30.9	31.1	31.1	31.3	27.9	28.1
Output: MEUI [kWh/(m2 * yr)]	49.1	49.3	49.7	49.9	48.7	48.9	48.6	48.8	45.7	46
Output: Better than ERS (%)	2640.0%	2660.0%	2700.0%	2730.0%	2590.0%	2610.0%	2570.0%	2600.0%	2250.0%	2270.0%
Output: Better than Envelope (%)	4490.0%	4440.0%	4380.0%	4350.0%	4550.0%	4520.0%	4510.0%	4480.0%	5070.0%	5040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7304	7204	7021	6921	7489	7389	7537	7437	8851	8752
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,029.86	$ 1,015.78	$ 989.93	$ 975.82	$ 1,055.95	$ 1,041.91	$ 1,062.66	$ 1,048.6	$ 1,247.95	$ 1,234.07
Annual savings in carbon tax for electricity [$/year]	$ 3.65	$ 3.6	$ 3.51	$ 3.46	$ 3.74	$ 3.69	$ 3.77	$ 3.72	$ 4.43	$ 4.38
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,033.52	$ 1,019.38	$ 993.44	$ 979.28	$ 1,059.69	$ 1,045.6	$ 1,066.43	$ 1,052.32	$ 1,252.37	$ 1,238.45
Annual savings in GHG from electricity savings [kg CO2e/year]	80.3	79.2	77.2	76.1	82.4	81.3	82.9	81.8	97.4	96.3
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 8,688.91	$ 8,431.83	$ 7,331.52	$ 7,073.9	$ 7,405.27	$ 7,148.92	$ 7,087.78	$ 6,831.07	$ 10,002.58	$ 9,749.15
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$.	$.	$ 7,200.	$ 7,200.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 3,400.	$ 3,400.	$.	$.	$ 2,200.	$ 2,200.	$.	$.

QUADPLEX Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7
Summary Data							
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 28,639.2	$ 29,231.4	$ 29,478.	$ 30,593.41	$ 30,399.2	$ 31,185.61	$ 29,918.
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 30,729.86	$ 31,365.29	$ 31,629.89	$ 32,826.73	$ 32,618.34	$ 33,462.16	$ 32,102.01
Net Present Value [$]	$ 27,682.26	$ 27,448.48	$ 26,852.96	$ 26,515.54	$ 26,317.2	$ 26,273.36	$ 26,254.4
Incremental dollars per GHG saving	$ 119.53	$ 121.24	$ 123.03	$ 125.95	$ 125.98	$ 127.6	$ 101.83
Auxiliary Energy Required Heating [GJ/yr]	27.3	26.8	27.3	26.2	26.7	25.7	27.8
Annual Energy DHW [GJ/yr]	54	54	54	54	54	54	52.9
Annual Energy Space Heating [GJ/yr]	27.3	26.8	27.3	26.2	26.7	25.7	27.8
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	185.1	184.6	185	184	184.5	183.5	184.5
Design Heating Load [W]	10699	10644.9	10645.2	10478	10587.1	10424	10757.1
Annual Energy Electricity [kWh/yr]	36412.2	36273	36408.5	36106.3	36258.8	35970.4	36565.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,089.01	$ 5,069.31	$ 5,088.49	$ 5,045.73	$ 5,067.31	$ 5,026.5	$ 5,110.65
Annual Energy Natural Gas [m3/yr]	1449.3	1449.3	1449.3	1449.3	1449.3	1449.3	1420.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 625.18	$ 625.18	$ 625.18	$ 625.18	$ 625.18	$ 625.18	$ 612.58
Step Code Level	4	4	4	4	4	4	4
HTAP Run Number	225724	229612	221854	238036	225742	242788	221837
Upgrade Package List	Pkg3310311232	Pkg3310411232	Pkg3310211233	Pkg3320312333	Pkg3310311233	Pkg3320412333	Pkg3310211232
GHGI [kg/m2]	6.93	6.92	6.93	6.92	6.92	6.92	6.81
% ICC	2.9%	3.0%	3.0%	3.1%	3.1%	3.2%	3.0%
Step Code Target Values							
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package							
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI (kWh/(m2 * yr)]	16.5	16.2	16.5	15.9	16.2	15.6	16.9
Output: MEUI (kWh/(m2 * yr)]	50	49.7	50	49.4	49.7	49.1	49.7
Output: Better than ERS (%)	2740.0%	2700.0%	2730.0%	2660.0%	2700.0%	2630.0%	2700.0%
Output: Better than Envelope (%)	7080.0%	7140.0%	7080.0%	7200.0%	7150.0%	7250.0%	7030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:							
Annual savings in electricity [kWh/yr]	21879	22018	21883	22185	22032	22321	21726
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,084.95	$ 3,104.58	$ 3,085.47	$ 3,128.08	$ 3,106.58	$ 3,147.25	$ 3,063.39
Annual savings in carbon tax for electricity [$/year]	$ 10.94	$ 11.01	$ 10.94	$ 11.09	$ 11.02	$ 11.16	$ 10.86
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,095.89	$ 3,115.59	$ 3,096.42	$ 3,139.18	$ 3,117.6	$ 3,158.41	$ 3,074.26
Annual savings in GHG from electricity savings [kg CO2e/year]	240.7	242.2	240.7	244	242.4	245.5	239
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	1.07
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ 9.87
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ 2.46
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ 12.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	1.1	1.1	54.8
Net Present Value [$]	$ 27,682.26	$ 27,448.48	$ 26,852.96	$ 26,515.54	$ 26,317.2	$ 26,273.36	$ 26,254.4
ECM Details Envelope Components							
Attic Ceiling RSI	5.64	5.64	5.64	6.34	5.64	6.34	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR32	UsrSpecR32	UsrSpecR36	UsrSpecR32	UsrSpecR36	UsrSpecR32
Flat Ceiling Cost of Upgrade	$ 205.63	$ 205.63	$ 205.63	$ 399.84	$ 205.63	$ 399.84	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 3,832.85	$ 4,425.05	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 2,911.65
Exposed Floor Code	NA	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components							
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 7,200.	$ 7,200.	$ 7,200.	$ 7,200.	$ 5,440.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.

QUADPLEX Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 43,208.37	$ 43,414.	$ 43,835.12	$ 44,129.57	$ 44,316.32	$ 44,335.2
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 46,362.58	$ 46,583.22	$ 47,035.08	$ 47,351.03	$ 47,551.41	$ 47,571.67
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,593.09	$ 2,852.6	$ 1,889.13	$ 2,853.47
Incremental dollars per GHG saving	$ 14.79	$ 14.85	$ 15.01	$ 15.1	$ 15.18	$ 15.17
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.1	42.6	39.3	41.6	38.5
Annual Energy DHW [GJ/yr]	28.1	28.1	27.5	28.1	28.1	28.1
Annual Energy Space Heating [GJ/yr]	18.3	18.1	19.4	18	19.1	17.8
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	161.3	161.1	161.9	161.1	162.2	160.8
Design Heating Load [W]	11138	10997.8	11545.4	11079.9	11375.5	10939.6
Annual Energy Electricity [kWh/yr]	44810.7	44750	44970.6	44755.4	45057.1	44675.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,277.4	$ 6,268.81	$ 6,300.02	$ 6,269.57	$ 6,312.26	$ 6,258.23
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	221632	221848	170009	225520	173914	225736
Upgrade Package List	Pkg3310211132	Pkg3310211232	Pkg3210211232	Pkg3310311132	Pkg3210311233	Pkg3310311232
GHGI [kg/m2]	1.08	1.07	1.08	1.07	1.08	1.07
% ICC	4.4%	4.4%	4.5%	4.5%	4.5%	4.5%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	24.2	23.7	25.8	23.8	25.2	23.3
Output: MEUI [kWh/(m2 * yr)]	34.5	34.4	34.8	34.4	35	34.2
Output: Better than ERS (%)	1100.0%	1090.0%	1140.0%	1090.0%	1160.0%	1070.0%
Output: Better than Envelope (%)	5740.0%	5820.0%	5450.0%	5800.0%	5560.0%	5890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	13481	13541	13321	13536	13234	13616
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,900.76	$ 1,909.32	$ 1,878.22	$ 1,908.56	$ 1,866.02	$ 1,919.87
Annual savings in carbon tax for electricity [$/year]	$ 6.74	$ 6.77	$ 6.66	$ 6.77	$ 6.62	$ 6.81
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,907.5	$ 1,916.09	$ 1,884.88	$ 1,915.33	$ 1,872.64	$ 1,926.68
Annual savings in GHG from electricity savings [kg CO2e/year]	148.3	149	146.5	148.9	145.6	149.8
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,593.09	$ 2,852.6	$ 1,889.13	$ 2,853.47
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	5.64	4.93	5.64	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR32
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$ 205.63	$.	$ 205.63	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	5.28	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 8,412.62	$ 10,191.5	$ 8,412.62	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 3,832.85
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$.	$.	$.

QUADPLEX Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 43,208.37	$ 43,414.	$ 43,835.12	$ 44,129.57	$ 44,335.2	$ 44,316.32
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 46,362.58	$ 46,583.22	$ 47,035.08	$ 47,351.03	$ 47,571.67	$ 47,551.41
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,593.09	$ 2,852.6	$ 2,853.47	$ 1,889.13
Incremental dollars per GHG saving	$ 14.79	$ 14.85	$ 15.01	$ 15.1	$ 15.17	$ 15.18
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.1	42.6	39.3	38.5	41.6
Annual Energy DHW [GJ/yr]	28.1	28.1	27.5	28.1	28.1	28.1
Annual Energy Space Heating [GJ/yr]	18.3	18.1	19.4	18	17.8	19.1
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	161.3	161.1	161.9	161.1	160.8	162.2
Design Heating Load [W]	11138	10997.8	11545.4	11079.9	10939.6	11375.5
Annual Energy Electricity [kWh/yr]	44810.7	44750	44970.6	44755.4	44675.2	45057.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,277.4	$ 6,268.81	$ 6,300.02	$ 6,269.57	$ 6,258.23	$ 6,312.26
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	221632	221848	170009	225520	225736	173914
Upgrade Package List	Pkg3310211132	Pkg3310211232	Pkg3210211232	Pkg3310311132	Pkg3310311232	Pkg3210311233
GHGI [kg/m2]	1.08	1.07	1.08	1.07	1.07	1.08
% ICC	4.4%	4.4%	4.5%	4.5%	4.5%	4.5%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	24.2	23.7	25.8	23.8	23.3	25.2
Output: MEUI [kWh/(m2 * yr)]	34.5	34.4	34.8	34.4	34.2	35
Output: Better than ERS (%)	1100.0%	1090.0%	1140.0%	1090.0%	1070.0%	1160.0%
Output: Better than Envelope (%)	5740.0%	5820.0%	5450.0%	5800.0%	5890.0%	5560.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	13481	13541	13321	13536	13616	13234
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,900.76	$ 1,909.32	$ 1,878.22	$ 1,908.56	$ 1,919.87	$ 1,866.02
Annual savings in carbon tax for electricity [$/year]	$ 6.74	$ 6.77	$ 6.66	$ 6.77	$ 6.81	$ 6.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,907.5	$ 1,916.09	$ 1,884.88	$ 1,915.33	$ 1,926.68	$ 1,872.64
Annual savings in GHG from electricity savings [kg CO2e/year]	148.3	149	146.5	148.9	149.8	145.6
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,593.09	$ 2,852.6	$ 2,853.47	$ 1,889.13
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	5.64	4.93	5.64	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR32
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$ 205.63	$.	$ 205.63	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	5.28	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 8,412.62	$ 10,191.5	$ 10,191.5	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 3,832.85
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$.	$.	$.

QUADPLEX Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 43,208.37	$ 43,414.	$ 44,335.2	$ 44,129.57	$ 43,835.12	$ 44,721.77
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 46,362.58	$ 46,583.22	$ 47,571.67	$ 47,351.03	$ 47,035.08	$ 47,986.46
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,853.47	$ 2,852.6	$ 2,593.09	$ 2,392.23
Incremental dollars per GHG saving	$ 14.79	$ 14.85	$ 15.17	$ 15.1	$ 15.01	$ 15.3
Auxiliary Energy Required Heating [GJ/yr]	39.9	39.1	38.5	39.3	42.6	38.7
Annual Energy DHW [GJ/yr]	28.1	28.1	28.1	28.1	27.5	28.1
Annual Energy Space Heating [GJ/yr]	18.3	18.1	17.8	18	19.4	17.8
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	161.3	161.1	160.8	161.1	161.9	160.9
Design Heating Load [W]	11138	10997.8	10939.6	11079.9	11545.4	11025.8
Annual Energy Electricity [kWh/yr]	44810.7	44750	44675.2	44755.4	44970.6	44704.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,277.4	$ 6,268.81	$ 6,258.23	$ 6,269.57	$ 6,300.02	$ 6,262.33
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	221632	221848	225736	225520	170009	229408
Upgrade Package List	Pkg3310211132	Pkg3310211232	Pkg3310311232	Pkg3310311132	Pkg3210211232	Pkg3310411132
GHGI [kg/m2]	1.08	1.07	1.07	1.07	1.08	1.07
% ICC	4.4%	4.4%	4.5%	4.5%	4.5%	4.6%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	24.2	23.7	23.3	23.8	25.8	23.4
Output: MEUI [kWh/(m2 * yr)]	34.5	34.4	34.2	34.4	34.8	34.3
Output: Better than ERS (%)	1100.0%	1090.0%	1070.0%	1090.0%	1140.0%	1070.0%
Output: Better than Envelope (%)	5740.0%	5820.0%	5890.0%	5800.0%	5450.0%	5870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	13481	13541	13616	13536	13321	13587
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,900.76	$ 1,909.32	$ 1,919.87	$ 1,908.56	$ 1,878.22	$ 1,915.78
Annual savings in carbon tax for electricity [$/year]	$ 6.74	$ 6.77	$ 6.81	$ 6.77	$ 6.66	$ 6.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,907.5	$ 1,916.09	$ 1,926.68	$ 1,915.33	$ 1,884.88	$ 1,922.57
Annual savings in GHG from electricity savings [kg CO2e/year]	148.3	149	149.8	148.9	146.5	149.5
Annual savings in natural gas [m3/year]	53.98	53.98	53.98	53.98	53.98	53.98
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1	$ 500.1
Annual savings in carbon tax for natural gas [$/year]	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82	$ 124.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92	$ 624.92
Annual savings in GHG from natural gas savings [kg CO2e/year]	2773.8	2773.8	2773.8	2773.8	2773.8	2773.8
Net Present Value [$]	$ 3,631.38	$ 3,582.05	$ 2,853.47	$ 2,852.6	$ 2,593.09	$ 2,392.23
ECM Details Envelope Components						
Attic Ceiling RSI	4.93	5.64	5.64	4.93	5.64	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$ 205.63	$ 205.63	$.	$ 205.63	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 8,412.62	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 2,911.65	$ 4,425.05
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 2,200.	$.

QUADPLEX Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 16,381.84	$ 16,381.84	$ 16,809.52	$ 16,809.52	$ 18,477.84	$ 18,477.84	$ 18,581.84	$ 18,581.84	$ 19,009.52	$ 19,009.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,445.95	$ 18,445.95	$ 18,927.52	$ 18,927.52	$ 20,806.05	$ 20,806.05	$ 20,923.15	$ 20,923.15	$ 21,404.72	$ 21,404.72
Net Present Value [$]	$ 47,350.57	$ 47,013.51	$ 22,439.29	$ 22,085.26	$ 18,889.61	$ 18,535.4	$ 45,411.99	$ 45,075.3	$ 20,929.83	$ 20,575.79
Incremental dollars per GHG saving	$ 60.41	$ 60.72	$ 5.58	$ 5.58	$ 6.15	$ 6.16	$ 55.8	$ 56.04	$ 6.31	$ 6.31
Auxiliary Energy Required Heating [GJ/yr]	64.4	64.9	87.1	87.6	89.7	90.2	64.4	64.9	86.7	87.2
Annual Energy DHW [GJ/yr]	56.4	56.4	29.3	29.3	29.3	29.3	55.2	55.2	28.7	28.7
Annual Energy Space Heating [GJ/yr]	64.4	64.8	87	87.5	89.7	90.2	64.4	64.9	86.7	87.2
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	225.6	226.1	221.2	221.7	223.8	224.3	224.4	224.9	220.2	220.7
Design Heating Load [W]	16242.3	16323.5	17275.8	17357	18375.7	18456.9	16242.3	16323.5	17275.8	17357
Annual Energy Electricity [kWh/yr]	46999.4	47130.3	61436.6	61574.1	62167.4	62305	47002.9	47133.7	61168.4	61305.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,587.1	$ 6,605.62	$ 8,629.96	$ 8,649.42	$ 8,733.37	$ 8,752.84	$ 6,587.6	$ 6,606.1	$ 8,592.01	$ 8,611.47
Annual Energy Natural Gas [m3/yr]	1514.3	1514.3	0	0	0	0	1482	1482	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 653.22	$ 653.22	$.	$.	$.	$.	$ 639.28	$ 639.28	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	9784	9739	6544	6589	3304	3259	9785	9740	6545	6500
Upgrade Package List	Pkg2210101131	Pkg2210101031	Pkg2110101131	Pkg2110102031	Pkg1210101131	Pkg1210101031	Pkg2210101131	Pkg2210101031	Pkg2110101131	Pkg2110101031
GHGI [kg/m2]	7.45	7.45	1.47	1.48	1.49	1.49	7.32	7.32	1.47	1.47
% ICC	1.7%	1.7%	1.7%	1.7%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	39	39.3	52.8	53.1	54.4	54.7	39	39.3	52.5	52.8
Output: MEUI [kWh/(m2 * yr)]	74.6	74.9	71.9	72.2	73.5	73.8	73.9	74.1	71.3	71.6
Output: Better than ERS (%)	2120.0%	2150.0%	1890.0%	1910.0%	2030.0%	2050.0%	2060.0%	2080.0%	1830.0%	1860.0%
Output: Better than Envelope (%)	4660.0%	4610.0%	2770.0%	2730.0%	2560.0%	2510.0%	4660.0%	4610.0%	2800.0%	2760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	24758	24627	10320	10183	9590	9452	24754	24623	10589	10451
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,490.84	$ 3,472.38	$ 1,455.19	$ 1,435.8	$ 1,352.15	$ 1,332.75	$ 3,490.34	$ 3,471.9	$ 1,493.01	$ 1,473.62
Annual savings in carbon tax for electricity [$/year]	$ 12.38	$ 12.31	$ 5.16	$ 5.09	$ 4.79	$ 4.73	$ 12.38	$ 12.31	$ 5.29	$ 5.23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,503.21	$ 3,484.69	$ 1,460.35	$ 1,440.89	$ 1,356.94	$ 1,337.47	$ 3,502.72	$ 3,484.21	$ 1,498.3	$ 1,478.84
Annual savings in GHG from electricity savings [kg CO2e/year]	272.3	270.9	113.5	112	105.5	104	272.3	270.9	116.5	115
Annual savings in natural gas [m3/year]	0.02	0.02	56.4	56.4	56.4	56.4	1.18	1.18	56.4	56.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 10.94	$ 10.94	$ 522.54	$ 522.54
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 2.73	$ 2.73	$ 130.42	$ 130.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 13.67	$ 13.67	$ 652.96	$ 652.96
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	2898.3	2898.3	2898.3	2898.3	60.7	60.7	2898.3	2898.3
Net Present Value [$]	$ 47,350.57	$ 47,013.51	$ 22,439.29	$ 22,085.26	$ 18,889.61	$ 18,535.4	$ 45,411.99	$ 45,075.3	$ 20,929.83	$ 20,575.79
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	5.28	5.28	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$ 2,200.

QUADPLEX Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 16,809.52	$ 16,809.52	$ 18,477.84	$ 18,477.84	$ 19,009.52	$ 19,009.52	$ 19,477.84	$ 19,477.84	$ 19,774.86	$ 19,721.17
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,927.52	$ 18,927.52	$ 20,806.05	$ 20,806.05	$ 21,404.72	$ 21,404.72	$ 21,932.05	$ 21,932.05	$ 22,266.49	$ 22,206.04
Net Present Value [$]	$ 22,439.29	$ 22,085.26	$ 18,889.61	$ 18,535.4	$ 20,929.83	$ 20,575.79	$ 25,353.69	$ 25,002.21	$ 20,798.06	$ 18,999.6
Incremental dollars per GHG saving	$ 5.58	$ 5.58	$ 6.15	$ 6.16	$ 6.31	$ 6.31	$ 6.42	$ 6.42	$ 6.55	$ 6.55
Auxiliary Energy Required Heating [GJ/yr]	87.1	87.6	89.7	90.2	86.7	87.2	79.3	79.8	85.2	87.8
Annual Energy DHW [GJ/yr]	29.3	29.3	29.3	29.3	28.7	28.7	29.3	29.3	29.3	29.3
Annual Energy Space Heating [GJ/yr]	87	87.5	89.7	90.2	86.7	87.2	79.2	79.7	85.2	87.8
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	221.2	221.7	223.8	224.3	220.2	220.7	213.4	213.9	219.3	221.9
Design Heating Load [W]	17275.8	17357	18375.7	18456.9	17275.8	17357	16242.3	16323.5	16242.3	17333.8
Annual Energy Electricity [kWh/yr]	61436.6	61574.1	62167.4	62305	61168.4	61305.9	59268.1	59404.6	60922.3	61641.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,629.96	$ 8,649.42	$ 8,733.37	$ 8,752.84	$ 8,592.01	$ 8,611.47	$ 8,323.12	$ 8,342.44	$ 8,557.19	$ 8,658.99
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	6544	6589	3304	3259	6545	6500	9784	9739	9775	6904
Upgrade Package List	Pkg2110101131	Pkg2110102031	Pkg1210101131	Pkg1210101031	Pkg2110101131	Pkg2110101031	Pkg2210101131	Pkg2210101031	Pkg2210101121	Pkg2110201131
GHGI [kg/m2]	1.47	1.48	1.49	1.49	1.47	1.47	1.42	1.43	1.46	1.48
% ICC	1.7%	1.7%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	52.8	53.1	54.4	54.7	52.5	52.8	48	48.3	51.6	53.2
Output: MEUI [kWh/(m2 * yr)]	71.9	72.2	73.5	73.8	71.3	71.6	67.2	67.5	70.8	72.3
Output: Better than ERS (%)	1890.0%	1910.0%	2030.0%	2050.0%	1830.0%	1860.0%	1470.0%	1490.0%	1780.0%	1920.0%
Output: Better than Envelope (%)	2770.0%	2730.0%	2560.0%	2510.0%	2800.0%	2760.0%	3420.0%	3380.0%	2930.0%	2710.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	10320	10183	9590	9452	10589	10451	12489	12352	10835	10115
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,455.19	$ 1,435.8	$ 1,352.15	$ 1,332.75	$ 1,493.01	$ 1,473.62	$ 1,760.95	$ 1,741.7	$ 1,527.71	$ 1,426.27
Annual savings in carbon tax for electricity [$/year]	$ 5.16	$ 5.09	$ 4.79	$ 4.73	$ 5.29	$ 5.23	$ 6.24	$ 6.18	$ 5.42	$ 5.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,460.35	$ 1,440.89	$ 1,356.94	$ 1,337.47	$ 1,498.3	$ 1,478.84	$ 1,767.19	$ 1,747.88	$ 1,533.12	$ 1,431.33
Annual savings in GHG from electricity savings [kg CO2e/year]	113.5	112	105.5	104	116.5	115	137.4	135.9	119.2	111.3
Annual savings in natural gas [m3/year]	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54
Annual savings in carbon tax for natural gas [$/year]	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96
Annual savings in GHG from natural gas savings [kg CO2e/year]	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3
Net Present Value [$]	$ 22,439.29	$ 22,085.26	$ 18,889.61	$ 18,535.4	$ 20,929.83	$ 20,575.79	$ 25,353.69	$ 25,002.21	$ 20,798.06	$ 18,999.6
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	5.28	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,911.65
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$.

QUADPLEX Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 23,244.3	$ 23,244.3	$ 23,913.52	$ 23,913.52	$ 20,844.3	$ 20,844.3	$ 25,313.52	$ 26,581.84	$ 24,210.54	$ 25,313.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 26,173.08	$ 26,173.08	$ 26,926.62	$ 26,926.62	$ 23,470.68	$ 23,470.68	$ 28,503.02	$ 29,931.15	$ 27,261.07	$ 28,503.02
Net Present Value [$]	$ 55,499.88	$ 55,351.62	$ 54,528.47	$ 54,382.4	$ 54,122.42	$ 53,986.21	$ 53,860.83	$ 53,831.34	$ 53,734.45	$ 53,713.12
Incremental dollars per GHG saving	$ 69.3	$ 69.45	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 75.07	$ 999,999.	$ 999,999.	$ 75.2
Auxiliary Energy Required Heating [GJ/yr]	88.9	89.4	70.1	70.6	87	87.5	81.9	62.8	75.4	82.4
Annual Energy DHW [GJ/yr]	56.4	56.4	73.7	73.7	73.7	73.7	56.4	73.7	73.7	56.4
Annual Energy Space Heating [GJ/yr]	37	37.2	29.9	30.1	36.4	36.6	34.8	27	31.9	35
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	204.6	204.8	216.9	217.1	221.7	221.9	204	214.1	217.6	204.2
Design Heating Load [W]	19088.5	19169.8	18172.3	18253.5	19427.4	19508.6	20221.9	17138.8	18172.3	20303.2
Annual Energy Electricity [kWh/yr]	41168.3	41225.9	39775.7	39832.4	41126	41178.9	41001.2	39010	39968.7	41058.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,762.	$ 5,770.15	$ 5,564.95	$ 5,572.97	$ 5,756.01	$ 5,763.5	$ 5,738.35	$ 5,456.6	$ 5,592.26	$ 5,746.48
Annual Energy Natural Gas [m3/yr]	1514.3	1514.3	1978.4	1978.4	1978.3	1978.3	1514.3	1978.4	1978.4	1514.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 653.22	$ 653.22	$ 853.41	$ 853.41	$ 853.37	$ 853.37	$ 653.22	$ 853.41	$ 853.41	$ 653.22
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	6526	6481	6544	6499	6526	6481	64	9784	6535	19
Upgrade Package List	Pkg2110101111	Pkg2110101011	Pkg2110101131	Pkg2110101031	Pkg2110101111	Pkg2110101011	Pkg1110101131	Pkg2210101131	Pkg2110101121	Pkg1110101031
GHGI [kg/m2]	7.31	7.31	9.22	9.22	9.25	9.25	7.31	9.22	9.22	7.31
% ICC	2.4%	2.4%	2.4%	2.4%	2.1%	2.1%	2.6%	2.7%	2.5%	2.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	53.9	54.2	42.5	42.7	52.7	53	49.6	38	45.7	49.9
Output: MEUI [kWh/(m2 * yr)]	61.2	61.4	68.4	68.6	71.6	71.7	60.7	66.8	69	60.8
Output: Better than ERS (%)	990.0%	1000.0%	1660.0%	1670.0%	1910.0%	1920.0%	960.0%	1500.0%	1690.0%	970.0%
Output: Better than Envelope (%)	2620.0%	2580.0%	4180.0%	4140.0%	2780.0%	2740.0%	3200.0%	4790.0%	3740.0%	3160.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	30589	30531	31981	31925	30631	30578	30756	32747	31788	30698
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,313.02	$ 4,304.9	$ 4,509.38	$ 4,501.38	$ 4,318.99	$ 4,311.53	$ 4,336.58	$ 4,617.34	$ 4,482.16	$ 4,328.49
Annual savings in carbon tax for electricity [$/year]	$ 15.29	$ 15.27	$ 15.99	$ 15.96	$ 15.32	$ 15.29	$ 15.38	$ 16.37	$ 15.89	$ 15.35
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,328.32	$ 4,320.16	$ 4,525.37	$ 4,517.35	$ 4,334.3	$ 4,326.82	$ 4,351.96	$ 4,633.71	$ 4,498.06	$ 4,343.84
Annual savings in GHG from electricity savings [kg CO2e/year]	336.5	335.8	351.8	351.2	336.9	336.4	338.3	360.2	349.7	337.7
Annual savings in natural gas [m3/year]	0.02	0.02	17.31	17.31	17.31	17.31	0.02	17.31	17.31	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ 160.42	$ 160.42	$ 160.38	$ 160.38	$ .21	$ 160.42	$ 160.42	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ 40.04	$ 40.04	$ 40.03	$ 40.03	$ .05	$ 40.04	$ 40.04	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ 200.46	$ 200.46	$ 200.41	$ 200.41	$ .26	$ 200.46	$ 200.46	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	889.8	889.8	889.6	889.6	1.1	889.8	889.8	1.1
Net Present Value [$]	$ 55,499.88	$ 55,351.62	$ 54,528.47	$ 54,382.4	$ 54,122.42	$ 53,986.21	$ 53,860.83	$ 53,831.34	$ 53,734.45	$ 53,713.12
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$.	$.	$.	$.	$ 2,400.	$.	$.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 25,912.62	$ 25,912.62	$ 26,313.52	$ 26,313.52	$ 26,610.54	$ 26,610.54	$ 26,644.3	$ 28,112.62	$ 28,112.62	$ 28,513.52
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 29,177.61	$ 29,177.61	$ 29,629.02	$ 29,629.02	$ 29,963.47	$ 29,963.47	$ 30,001.48	$ 31,654.81	$ 31,654.81	$ 32,106.22
Net Present Value [$]	$ 55,046.32	$ 54,897.33	$ 55,918.03	$ 55,771.97	$ 54,954.4	$ 54,808.33	$ 52,541.24	$ 53,113.76	$ 52,964.77	$ 53,985.66
Incremental dollars per GHG saving	$ 75.15	$ 75.28	$ 75.12	$ 75.25	$ 76.6	$ 76.73	$ 60.92	$ 69.14	$ 69.24	$ 69.19
Auxiliary Energy Required Heating [GJ/yr]	81.1	81.6	71.8	72.2	77.2	77.7	88.9	81.1	81.6	71.8
Annual Energy DHW [GJ/yr]	56.4	56.4	56.4	56.4	56.4	56.4	54.4	55.2	55.2	55.2
Annual Energy Space Heating [GJ/yr]	33.9	34.1	30.5	30.7	32.4	32.6	37	33.9	34.1	30.5
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	201.5	201.7	199.7	199.9	200.7	200.9	202.6	200.3	200.5	198.5
Design Heating Load [W]	18055.1	18136.3	17833.5	17914.7	17833.5	17914.7	19088.5	18055.1	18136.3	17833.5
Annual Energy Electricity [kWh/yr]	40308	40365.9	39813.7	39870.4	40072.6	40129.4	41170.3	40309.2	40367.1	39814.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,640.27	$ 5,648.46	$ 5,570.32	$ 5,578.35	$ 5,606.96	$ 5,615.	$ 5,762.28	$ 5,640.44	$ 5,648.63	$ 5,570.48
Annual Energy Natural Gas [m3/yr]	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3	1461	1482	1482	1482
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 630.22	$ 639.28	$ 639.28	$ 639.28
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	9766	9721	6544	6499	6535	6490	6528	9767	9722	6545
Upgrade Package List	Pkg2210101111	Pkg2210101011	Pkg2110101131	Pkg2110101031	Pkg2110101121	Pkg2110101021	Pkg2110101111	Pkg2210101111	Pkg2210101011	Pkg2110101131
GHGI [kg/m2]	7.29	7.29	7.28	7.28	7.29	7.29	7.09	7.16	7.16	7.14
% ICC	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.9%	2.9%	2.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	49.1	49.4	43.5	43.8	46.8	47.1	53.9	49.1	49.4	43.5
Output: MEUI [kWh/(m2 * yr)]	59.4	59.5	58.1	58.2	58.8	58.9	60	58.6	58.8	57.4
Output: Better than ERS (%)	830.0%	840.0%	730.0%	740.0%	780.0%	800.0%	890.0%	760.0%	770.0%	670.0%
Output: Better than Envelope (%)	3270.0%	3230.0%	4040.0%	4010.0%	3590.0%	3550.0%	2620.0%	3270.0%	3230.0%	4040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31449	31391	31943	31887	31684	31628	30587	31448	31390	31942
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,434.32	$ 4,426.16	$ 4,504.02	$ 4,496.02	$ 4,467.51	$ 4,459.51	$ 4,312.74	$ 4,434.15	$ 4,425.99	$ 4,503.86
Annual savings in carbon tax for electricity [$/year]	$ 15.72	$ 15.7	$ 15.97	$ 15.94	$ 15.84	$ 15.81	$ 15.29	$ 15.72	$ 15.7	$ 15.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,450.05	$ 4,441.85	$ 4,519.99	$ 4,511.97	$ 4,483.36	$ 4,475.32	$ 4,328.03	$ 4,449.88	$ 4,441.68	$ 4,519.84
Annual savings in GHG from electricity savings [kg CO2e/year]	345.9	345.3	351.4	350.8	348.5	347.9	336.5	345.9	345.3	351.4
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	1.96	1.18	1.18	1.18
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ 18.19	$ 10.94	$ 10.94	$ 10.94
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ 4.54	$ 2.73	$ 2.73	$ 2.73
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ 22.73	$ 13.67	$ 13.67	$ 13.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	1.1	1.1	100.9	60.7	60.7	60.7
Net Present Value [$]	$ 55,046.32	$ 54,897.33	$ 55,918.03	$ 55,771.97	$ 54,954.4	$ 54,808.33	$ 52,541.24	$ 53,113.76	$ 52,964.77	$ 53,985.66
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.67	4.93	4.93	4.67	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	NA	NA	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$.	$.	$.	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	3.87	3.87	3.87	5.28	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 3,400.	$ 2,200.	$ 2,200.	$ 2,200.

QUADPLEX Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,814.	$ 31,529.57	$ 31,735.2	$ 32,121.77	$ 32,327.4	$ 32,368.37
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 34,696.56	$ 35,502.3	$ 35,733.84	$ 36,169.11	$ 36,400.65	$ 36,446.78
Net Present Value [$]	$ 28,538.51	$ 27,644.01	$ 28,212.72	$ 27,611.43	$ 28,178.14	$ 26,828.76
Incremental dollars per GHG saving	$ 9.95	$ 10.18	$ 10.24	$ 10.36	$ 10.42	$ 10.45
Auxiliary Energy Required Heating [GJ/yr]	59.9	60.2	59.1	59.4	58.3	60.1
Annual Energy DHW [GJ/yr]	29.3	29.3	29.3	29.3	29.3	29.3
Annual Energy Space Heating [GJ/yr]	59.9	60.2	59.1	59.4	58.3	60.1
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	193.1	193.3	192.2	192.5	191.4	193.3
Design Heating Load [W]	13965	14081.3	13899.4	14019.9	13838	14001.7
Annual Energy Electricity [kWh/yr]	53627.7	53697.2	53396.4	53479.8	53179.8	53688
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,525.	$ 7,534.84	$ 7,492.28	$ 7,504.08	$ 7,461.63	$ 7,533.54
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4
HTAP Run Number	36973	37585	37621	38233	38269	36940
Upgrade Package List	Pkg3310211232	Pkg3310311132	Pkg3310311232	Pkg3310411132	Pkg3310411232	Pkg3310211133
GHGI [kg/m2]	1.29	1.29	1.28	1.28	1.28	1.29
% ICC	3.1%	3.2%	3.2%	3.3%	3.3%	3.3%
Step Code Target Values						
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	36.3	36.5	35.8	36	35.3	36.4
Output: MEUI [kWh/(m2 * yr)]	54.9	55	54.4	54.5	53.9	55
Output: Better than ERS (%)	380.0%	390.0%	330.0%	340.0%	280.0%	390.0%
Output: Better than Envelope (%)	5030.0%	5000.0%	5100.0%	5070.0%	5160.0%	5010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	18129	18060	18361	18277	18577	18069
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,556.25	$ 2,546.45	$ 2,588.86	$ 2,577.1	$ 2,619.4	$ 2,547.74
Annual savings in carbon tax for electricity [$/year]	$ 9.06	$ 9.03	$ 9.18	$ 9.14	$ 9.29	$ 9.03
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,565.31	$ 2,555.48	$ 2,598.04	$ 2,586.24	$ 2,628.69	$ 2,556.78
Annual savings in GHG from electricity savings [kg CO2e/year]	199.4	198.7	202	201.1	204.4	198.8
Annual savings in natural gas [m3/year]	56.4	56.4	56.4	56.4	56.4	56.4
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54	$ 522.54
Annual savings in carbon tax for natural gas [$/year]	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42	$ 130.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96	$ 652.96
Annual savings in GHG from natural gas savings [kg CO2e/year]	2898.3	2898.3	2898.3	2898.3	2898.3	2898.3
Net Present Value [$]	$ 28,538.51	$ 27,644.01	$ 28,212.72	$ 27,611.43	$ 28,178.14	$ 26,828.76
ECM Details Envelope Components						
Attic Ceiling RSI	5.64	4.93	5.64	4.93	5.64	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR28
Flat Ceiling Cost of Upgrade	$ 205.63	$.	$ 205.63	$.	$ 205.63	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 4,425.05	$ 2,911.65
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

QUADPLEX Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 26,313.52	$ 26,313.52	$ 28,981.84	$ 28,981.84	$ 25,912.62	$ 26,610.54	$ 25,912.62	$ 26,610.54	$ 29,278.86	$ 29,278.86
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 29,629.02	$ 29,629.02	$ 32,633.55	$ 32,633.55	$ 29,177.61	$ 29,963.47	$ 29,177.61	$ 29,963.47	$ 32,968.	$ 32,968.
Net Present Value [$]	$ 55,918.03	$ 55,771.97	$ 55,362.59	$ 55,217.61	$ 55,046.32	$ 54,954.4	$ 54,897.33	$ 54,808.33	$ 54,430.72	$ 54,283.37
Incremental dollars per GHG saving	$ 75.12	$ 75.25	$ 80.66	$ 80.8	$ 75.15	$ 76.6	$ 75.28	$ 76.73	$ 82.11	$ 82.24
Auxiliary Energy Required Heating [GJ/yr]	71.8	72.2	64.4	64.9	81.1	77.2	81.6	77.7	69.6	70.1
Annual Energy DHW [GJ/yr]	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4
Annual Energy Space Heating [GJ/yr]	30.5	30.7	27.6	27.7	33.9	32.4	34.1	32.6	29.5	29.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	199.7	199.9	196.8	197	201.5	200.7	201.7	200.9	197.7	197.9
Design Heating Load [W]	17833.5	17914.7	16800	16881.2	18055.1	17833.5	18136.3	17914.7	16800	16881.2
Annual Energy Electricity [kWh/yr]	39813.7	39870.4	38993	39049.3	40308	40072.6	40365.9	40129.4	39239.6	39296.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,570.32	$ 5,578.35	$ 5,454.19	$ 5,462.16	$ 5,640.27	$ 5,606.96	$ 5,648.46	$ 5,615.	$ 5,489.09	$ 5,497.18
Annual Energy Natural Gas [m3/yr]	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3	1514.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22	$ 653.22
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6544	6499	9784	9739	9766	6535	9721	6490	9775	9730
Upgrade Package List	Pkg2110101131	Pkg2110101031	Pkg2210101131	Pkg2210101031	Pkg2210101111	Pkg2110101121	Pkg2210101011	Pkg2110101021	Pkg2210101121	Pkg2210101021
GHGI [kg/m2]	7.28	7.28	7.26	7.26	7.29	7.29	7.29	7.29	7.27	7.27
% ICC	2.7%	2.7%	3.0%	3.0%	2.6%	2.7%	2.6%	2.7%	3.0%	3.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	43.5	43.8	39	39.3	49.1	46.8	49.4	47.1	42.2	42.5
Output: MEUI [kWh/(m2 * yr)]	58.1	58.2	56.3	56.4	59.4	58.8	59.5	58.9	57	57.1
Output: Better than ERS (%)	730.0%	740.0%	570.0%	590.0%	830.0%	780.0%	840.0%	800.0%	620.0%	630.0%
Output: Better than Envelope (%)	4040.0%	4010.0%	4660.0%	4610.0%	3270.0%	3590.0%	3230.0%	3550.0%	4220.0%	4180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31943	31887	32764	32708	31449	31684	31391	31628	32518	32460
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,504.02	$ 4,496.02	$ 4,619.74	$ 4,611.8	$ 4,434.32	$ 4,467.51	$ 4,426.16	$ 4,459.51	$ 4,584.97	$ 4,576.9
Annual savings in carbon tax for electricity [$/year]	$ 15.97	$ 15.94	$ 16.38	$ 16.35	$ 15.72	$ 15.84	$ 15.7	$ 15.81	$ 16.26	$ 16.23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,519.99	$ 4,511.97	$ 4,636.12	$ 4,628.15	$ 4,450.05	$ 4,483.36	$ 4,441.85	$ 4,475.32	$ 4,601.23	$ 4,593.13
Annual savings in GHG from electricity savings [kg CO2e/year]	351.4	350.8	360.4	359.8	345.9	348.5	345.3	347.9	357.7	357.1
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Net Present Value [$]	$ 55,918.03	$ 55,771.97	$ 55,362.59	$ 55,217.61	$ 55,046.32	$ 54,954.4	$ 54,897.33	$ 54,808.33	$ 54,430.72	$ 54,283.37
ECM Details Envelope Components										
Attic Ceiling RSI	4.93	4.67	4.93	4.67	4.93	4.93	4.67	4.67	4.93	4.67
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	UsrSpecR28	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	USI1 40 SHGC0 25	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$.	$ 3,366.24	$.	$ 3,366.24	$ 3,366.24	$ 3,366.24
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	5.28	3.87	5.28	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 8,412.62	$ 5,744.3	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 19,477.84	$ 19,477.84	$ 19,844.3	$ 19,844.3	$ 20,844.3	$ 20,844.3	$ 21,677.84	$ 21,677.84	$ 21,821.84	$ 21,821.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,255.72	$ 29,255.72	$ 29,806.14	$ 29,806.14	$ 31,308.14	$ 31,308.14	$ 32,560.12	$ 32,560.12	$ 32,776.4	$ 32,776.4
Net Present Value [$]	$ 45,022.66	$ 44,876.04	$ 76,080.57	$ 76,006.81	$ 81,999.27	$ 81,926.05	$ 43,662.	$ 43,515.2	$ 73,229.92	$ 73,091.15
Incremental dollars per GHG saving	$ 5.79	$ 5.79	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 6.44	$ 6.44	$ 53.87	$ 53.95
Auxiliary Energy Required Heating [GJ/yr]	117.9	118.2	148.4	148.6	129.9	130.1	117.5	117.7	88.7	88.9
Annual Energy DHW [GJ/yr]	31.7	31.7	79.3	79.3	79.3	79.3	31	31	61.2	61.2
Annual Energy Space Heating [GJ/yr]	117.9	118.1	78	78.1	68.3	68.4	117.5	117.7	88.7	88.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.3	1.3
Total Energy [GJ/yr]	254.5	254.7	264.9	265	255.3	255.4	253.3	253.5	253.8	253.9
Design Heating Load [W]	20061.4	20092.3	27669.7	27700.6	24092.9	24123.8	20061.4	20092.3	19384.2	19415.2
Annual Energy Electricity [kWh/yr]	70694.5	70751.5	51555.9	51584.5	48868.4	48896.9	70368.5	70425.5	53477.5	53531.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,939.96	$ 9,948.02	$ 7,231.84	$ 7,235.89	$ 6,851.56	$ 6,855.6	$ 9,893.83	$ 9,901.89	$ 7,503.75	$ 7,511.38
Annual Energy Natural Gas [m3/yr]	0	0	2130.7	2130.7	2130.7	2130.7	0	0	1644.3	1644.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 919.11	$ 919.11	$ 919.11	$ 919.11	$.	$.	$ 709.29	$ 709.29
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58435	58705	10	280	38890	39160	58436	58706	58450	58720
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg1110101011	Pkg1110101111	Pkg2110101011	Pkg2110101111	Pkg2210101031	Pkg2210101131	Pkg2210101032	Pkg2210101132
GHGI [kg/m2]	1.7	1.7	10.13	10.14	10.07	10.07	1.69	1.69	8.15	8.15
% ICC	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	71.5	71.6	89.9	90	78.7	78.8	71.2	71.3	53.7	53.9
Output: MEUI [kWh/(m2 * yr)]	92.1	92.2	98.2	98.2	92.3	92.4	91.4	91.5	91.6	91.8
Output: Better than ERS (%)	780.0%	790.0%	1220.0%	1230.0%	820.0%	820.0%	730.0%	740.0%	750.0%	760.0%
Output: Better than Envelope (%)	3490.0%	3470.0%	1810.0%	1790.0%	2830.0%	2820.0%	3510.0%	3500.0%	5100.0%	5090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19706	19649	38845	38816	41532	41504	20032	19975	36923	36869
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,778.57	$ 2,770.54	$ 5,477.12	$ 5,473.08	$ 5,856.05	$ 5,852.04	$ 2,824.54	$ 2,816.5	$ 5,206.17	$ 5,198.57
Annual savings in carbon tax for electricity [$/year]	$ 9.85	$ 9.82	$ 19.42	$ 19.41	$ 20.77	$ 20.75	$ 10.02	$ 9.99	$ 18.46	$ 18.43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,788.43	$ 2,780.36	$ 5,496.54	$ 5,492.49	$ 5,876.82	$ 5,872.79	$ 2,834.56	$ 2,826.49	$ 5,224.63	$ 5,217.01
Annual savings in GHG from electricity savings [kg CO2e/year]	216.8	216.1	427.3	427	456.9	456.5	220.4	219.7	406.2	405.6
Annual savings in natural gas [m3/year]	61.24	61.24	18.15	18.15	18.15	18.15	61.24	61.24	0.02	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 567.41	$ 567.41	$ 168.11	$ 168.11	$ 168.11	$ 168.11	$ 567.41	$ 567.41	$ .21	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ 141.62	$ 141.62	$ 41.96	$ 41.96	$ 41.96	$ 41.96	$ 141.62	$ 141.62	$ .05	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 709.03	$ 709.03	$ 210.07	$ 210.07	$ 210.07	$ 210.07	$ 709.03	$ 709.03	$ .26	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	3147.2	3147.2	932.5	932.5	932.5	932.5	3147.2	3147.2	1.1	1.1
Net Present Value [$]	$ 45,022.66	$ 44,876.04	$ 76,080.57	$ 76,006.81	$ 81,999.27	$ 81,926.05	$ 43,662.	$ 43,515.2	$ 73,229.92	$ 73,091.15
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$.	$.	$.	$.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$.	$.

QUADPLEX Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 19,477.84	$ 19,477.84	$ 21,677.84	$ 21,677.84	$ 22,249.52	$ 22,249.52	$ 22,389.49	$ 22,389.49	$ 22,546.54	$ 22,546.54
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 29,255.72	$ 29,255.72	$ 32,560.12	$ 32,560.12	$ 33,418.78	$ 33,418.78	$ 33,629.01	$ 33,629.01	$ 33,864.9	$ 33,864.9
Net Present Value [$]	$ 45,022.66	$ 44,876.04	$ 43,662.	$ 43,515.2	$ 44,702.91	$ 44,556.3	$ 41,461.37	$ 41,314.21	$ 39,462.95	$ 39,313.41
Incremental dollars per GHG saving	$ 5.79	$ 5.79	$ 6.44	$ 6.44	$ 6.59	$ 6.6	$ 6.66	$ 6.66	$ 6.72	$ 6.73
Auxiliary Energy Required Heating [GJ/yr]	117.9	118.2	117.5	117.7	115.5	115.7	118.9	119.1	122.4	122.7
Annual Energy DHW [GJ/yr]	31.7	31.7	31	31	31.7	31.7	31.7	31.7	31.7	31.7
Annual Energy Space Heating [GJ/yr]	117.9	118.1	117.5	117.7	115.5	115.7	118.8	119	122.4	122.6
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	1.3	1.3	2.3	2.3	1.3	1.3
Total Energy [GJ/yr]	254.5	254.7	253.3	253.5	251.1	251.3	255.4	255.6	258	258.2
Design Heating Load [W]	20061.4	20092.3	20061.4	20092.3	20611.5	20642.4	20125.1	20156	20611.5	20642.4
Annual Energy Electricity [kWh/yr]	70694.5	70751.5	70368.5	70425.5	69742.1	69799.1	70946.9	71004	71662.1	71720.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,939.96	$ 9,948.02	$ 9,893.83	$ 9,901.89	$ 9,805.19	$ 9,813.26	$ 9,975.67	$ 9,983.75	$ 10,076.87	$ 10,085.09
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58435	58705	58436	58706	39013	39283	60595	60865	38959	39229
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101031	Pkg2210101131	Pkg2110101032	Pkg2110101132	Pkg2210201031	Pkg2210201131	Pkg2110101022	Pkg2110101122
GHGI [kg/m2]	1.7	1.7	1.69	1.69	1.67	1.67	1.7	1.7	1.72	1.72
% ICC	2.0%	2.0%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	71.5	71.6	71.2	71.3	70	70.1	72	72.1	74.2	74.3
Output: MEUI [kWh/(m2 * yr)]	92.1	92.2	91.4	91.5	90	90.1	92.6	92.8	94.2	94.3
Output: Better than ERS (%)	780.0%	790.0%	730.0%	740.0%	640.0%	650.0%	820.0%	830.0%	930.0%	940.0%
Output: Better than Envelope (%)	3490.0%	3470.0%	3510.0%	3500.0%	3620.0%	3610.0%	3430.0%	3420.0%	3240.0%	3220.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19706	19649	20032	19975	20659	20602	19454	19397	18739	18680
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,778.57	$ 2,770.54	$ 2,824.54	$ 2,816.5	$ 2,912.86	$ 2,904.83	$ 2,742.99	$ 2,734.93	$ 2,642.14	$ 2,633.95
Annual savings in carbon tax for electricity [$/year]	$ 9.85	$ 9.82	$ 10.02	$ 9.99	$ 10.33	$ 10.3	$ 9.73	$ 9.7	$ 9.37	$ 9.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,788.43	$ 2,780.36	$ 2,834.56	$ 2,826.49	$ 2,923.19	$ 2,915.13	$ 2,752.71	$ 2,744.63	$ 2,651.51	$ 2,643.29
Annual savings in GHG from electricity savings [kg CO2e/year]	216.8	216.1	220.4	219.7	227.2	226.6	214	213.4	206.1	205.5
Annual savings in natural gas [m3/year]	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41
Annual savings in carbon tax for natural gas [$/year]	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2
Net Present Value [$]	$ 45,022.66	$ 44,876.04	$ 43,662.	$ 43,515.2	$ 44,702.91	$ 44,556.3	$ 41,461.37	$ 41,314.21	$ 39,462.95	$ 39,313.41
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,911.65	$ 2,911.65	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$.	$.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 26,313.52	$ 26,313.52	$ 26,581.84	$ 26,581.84	$ 26,610.54	$ 26,610.54	$ 23,913.52	$ 23,913.52	$ 28,513.52	$ 32,021.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 39,522.91	$ 39,522.91	$ 39,925.92	$ 39,925.92	$ 39,969.03	$ 39,969.03	$ 35,918.11	$ 35,918.11	$ 42,827.31	$ 48,096.8
Net Present Value [$]	$ 86,650.56	$ 86,579.53	$ 85,522.8	$ 85,452.33	$ 85,082.93	$ 85,010.08	$ 84,906.42	$ 84,835.58	$ 84,770.96	$ 84,766.42
Incremental dollars per GHG saving	$ 54.64	$ 54.67	$ 999,999.	$ 999,999.	$ 55.88	$ 55.92	$ 999,999.	$ 999,999.	$ 51.3	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	109.7	109.9	99.5	99.7	116.2	116.4	108.9	109.1	109.7	88.1
Annual Energy DHW [GJ/yr]	61.2	61.2	79.3	79.3	61.2	61.2	79.3	79.3	59.8	79.3
Annual Energy Space Heating [GJ/yr]	59	59.1	54.3	54.4	61.6	61.7	58.9	59	59	48.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.3
Total Energy [GJ/yr]	228.7	228.8	242.3	242.4	230.5	230.6	246.9	247	227.3	235.8
Design Heating Load [W]	22072.2	22103.1	21375.2	21406.1	22072.2	22103.1	22602.5	22633.4	22072.2	20698.1
Annual Energy Electricity [kWh/yr]	46519.8	46547.4	45271.1	45298.5	47013.3	47041.6	46547	46574.5	46521.6	43451.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,519.24	$ 6,523.14	$ 6,342.55	$ 6,346.42	$ 6,589.07	$ 6,593.07	$ 6,523.09	$ 6,526.98	$ 6,519.49	$ 6,085.07
Annual Energy Natural Gas [m3/yr]	1644.3	1644.3	2130.7	2130.7	1644.3	1644.3	2130.7	2130.7	1605.5	2130.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 709.29	$ 709.29	$ 919.11	$ 919.11	$ 709.29	$ 709.29	$ 919.11	$ 919.11	$ 692.56	$ 919.15
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39001	39271	58438	58708	38947	39217	38998	39268	39002	58456
Upgrade Package List	Pkg2110101031	Pkg2110101131	Pkg2210101031	Pkg2210101131	Pkg2110101021	Pkg2110101121	Pkg2110101031	Pkg2110101131	Pkg2110101031	Pkg2210101032
GHGI [kg/m2]	7.98	7.98	9.98	9.98	7.99	8	10.01	10.02	7.82	9.94
% ICC	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.4%	2.4%	2.9%	3.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	66.5	66.6	60.3	60.4	70.4	70.5	66	66.1	66.5	53.4
Output: MEUI [kWh/(m2 * yr)]	76.1	76.2	84.4	84.4	77.3	77.4	87.1	87.2	75.2	80.4
Output: Better than ERS (%)	310.0%	310.0%	270.0%	270.0%	230.0%	230.0%	460.0%	470.0%	370.0%	10.0%
Output: Better than Envelope (%)	3940.0%	3930.0%	4510.0%	4490.0%	3580.0%	3570.0%	3990.0%	3980.0%	3940.0%	5140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	43881	43853	45130	45102	43387	43359	43854	43826	43879	46949
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,187.21	$ 6,183.32	$ 6,363.27	$ 6,359.41	$ 6,117.62	$ 6,113.63	$ 6,183.37	$ 6,179.49	$ 6,186.95	$ 6,619.84
Annual savings in carbon tax for electricity [$/year]	$ 21.94	$ 21.93	$ 22.56	$ 22.55	$ 21.69	$ 21.68	$ 21.93	$ 21.91	$ 21.94	$ 23.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,209.15	$ 6,205.24	$ 6,385.84	$ 6,381.96	$ 6,139.32	$ 6,135.31	$ 6,205.3	$ 6,201.41	$ 6,208.89	$ 6,643.31
Annual savings in GHG from electricity savings [kg CO2e/year]	482.7	482.4	496.4	496.1	477.3	477	482.4	482.1	482.7	516.4
Annual savings in natural gas [m3/year]	0.02	0.02	18.15	18.15	0.02	0.02	18.15	18.15	1.42	18.15
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ 168.11	$ 168.11	$ .21	$ .21	$ 168.11	$ 168.11	$ 13.19	$ 168.15
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ 41.96	$ 41.96	$ .05	$ .05	$ 41.96	$ 41.96	$ 3.29	$ 41.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ 210.07	$ 210.07	$ .26	$ .26	$ 210.07	$ 210.07	$ 16.48	$ 210.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	932.5	932.5	1.1	1.1	932.5	932.5	73.1	932.6
Net Present Value [$]	$ 86,650.56	$ 86,579.53	$ 85,522.8	$ 85,452.33	$ 85,082.93	$ 85,010.08	$ 84,906.42	$ 84,835.58	$ 84,770.96	$ 84,766.42
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 5,440.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$.	$.	$ 2,400.	$ 2,400.	$.	$.	$ 2,400.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,200.	$.

QUADPLEX Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 28,981.84	$ 28,981.84	$ 29,008.62	$ 29,008.62	$ 29,278.86	$ 29,278.86	$ 29,409.52	$ 29,409.52	$ 29,706.54	$ 29,706.54
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,530.72	$ 43,530.72	$ 43,570.95	$ 43,570.95	$ 43,976.85	$ 43,976.85	$ 44,173.1	$ 44,173.1	$ 44,619.22	$ 44,619.22
Net Present Value [$]	$ 87,231.7	$ 87,161.04	$ 66,911.29	$ 66,835.15	$ 85,628.29	$ 85,554.71	$ 69,798.74	$ 69,723.52	$ 67,719.51	$ 67,643.01
Incremental dollars per GHG saving	$ 58.49	$ 58.53	$ 8.29	$ 8.29	$ 59.77	$ 59.8	$ 8.37	$ 8.37	$ 8.48	$ 8.48
Auxiliary Energy Required Heating [GJ/yr]	100.2	100.4	140.3	140.5	106.4	106.6	127.9	128.1	135.1	135.3
Annual Energy DHW [GJ/yr]	61.2	61.2	31.7	31.7	61.2	61.2	31.7	31.7	31.7	31.7
Annual Energy Space Heating [GJ/yr]	54.3	54.4	71.7	71.9	56.9	57	66.6	66.7	69.5	69.6
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	224.2	224.3	210.6	210.7	226	226.1	206	206.1	208.5	208.6
Design Heating Load [W]	20844.9	20875.8	22335.3	22366.2	20844.9	20875.8	22072.2	22103.1	22072.2	22103.1
Annual Energy Electricity [kWh/yr]	45257.6	45285	58490.2	58519.8	45765	45793.6	57212.9	57242.1	57905.2	57934.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,340.64	$ 6,344.51	$ 8,213.05	$ 8,217.24	$ 6,412.43	$ 6,416.48	$ 8,032.31	$ 8,036.44	$ 8,130.27	$ 8,134.47
Annual Energy Natural Gas [m3/yr]	1644.3	1644.3	0	0	1644.3	1644.3	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 709.29	$ 709.29	$.	$.	$ 709.29	$ 709.29	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58441	58711	58336	58606	58387	58657	39004	39274	38950	39220
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101011	Pkg2210101111	Pkg2210101021	Pkg2210101121	Pkg2110101031	Pkg2110101131	Pkg2110101021	Pkg2110101121
GHGI [kg/m2]	7.95	7.95	1.4	1.4	7.96	7.97	1.37	1.37	1.39	1.39
% ICC	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	60.7	60.8	85	85.1	64.5	64.6	77.5	77.6	81.9	82
Output: MEUI [kWh/(m2 * yr)]	73.4	73.4	65.3	65.4	74.5	74.6	62.4	62.5	64	64.1
Output: Better than ERS (%)	500.0%	500.0%	1080.0%	1070.0%	420.0%	420.0%	1270.0%	1270.0%	1170.0%	1160.0%
Output: Better than Envelope (%)	4470.0%	4460.0%	2250.0%	2240.0%	4120.0%	4110.0%	2940.0%	2930.0%	2540.0%	2530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	45143	45116	31910	31881	44636	44607	33188	33159	32496	32466
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,365.18	$ 6,361.31	$ 4,499.38	$ 4,495.21	$ 6,293.63	$ 6,289.6	$ 4,679.48	$ 4,675.36	$ 4,581.87	$ 4,577.68
Annual savings in carbon tax for electricity [$/year]	$ 22.57	$ 22.56	$ 15.96	$ 15.94	$ 22.32	$ 22.3	$ 16.59	$ 16.58	$ 16.25	$ 16.23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,387.75	$ 6,383.87	$ 4,515.34	$ 4,511.15	$ 6,315.95	$ 6,311.9	$ 4,696.07	$ 4,691.94	$ 4,598.11	$ 4,593.91
Annual savings in GHG from electricity savings [kg CO2e/year]	496.6	496.3	351	350.7	491	490.7	365.1	364.7	357.5	357.1
Annual savings in natural gas [m3/year]	0.02	0.02	61.24	61.24	0.02	0.02	61.24	61.24	61.24	61.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ 567.41	$ 567.41	$ .21	$ .21	$ 567.41	$ 567.41	$ 567.41	$ 567.41
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ 141.62	$ 141.62	$ .05	$ .05	$ 141.62	$ 141.62	$ 141.62	$ 141.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ 709.03	$ 709.03	$ .26	$ .26	$ 709.03	$ 709.03	$ 709.03	$ 709.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	3147.2	3147.2	1.1	1.1	3147.2	3147.2	3147.2	3147.2
Net Present Value [$]	$ 87,231.7	$ 87,161.04	$ 66,911.29	$ 66,835.15	$ 85,628.29	$ 85,554.71	$ 69,798.74	$ 69,723.52	$ 67,719.51	$ 67,643.01
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 25	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 29,008.62	$ 29,008.62	$ 29,409.52	$ 29,409.52	$ 29,706.54	$ 29,706.54	$ 31,208.62	$ 31,208.62	$ 31,609.52	$ 31,609.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,570.95	$ 43,570.95	$ 44,173.1	$ 44,173.1	$ 44,619.22	$ 44,619.22	$ 46,875.35	$ 46,875.35	$ 47,477.5	$ 47,477.5
Net Present Value [$]	$ 66,911.29	$ 66,835.15	$ 69,798.74	$ 69,723.52	$ 67,719.51	$ 67,643.01	$ 65,370.05	$ 65,293.55	$ 68,251.12	$ 68,175.89
Incremental dollars per GHG saving	$ 8.29	$ 8.29	$ 8.37	$ 8.37	$ 8.48	$ 8.48	$ 8.91	$ 8.92	$ 8.99	$ 8.99
Auxiliary Energy Required Heating [GJ/yr]	140.3	140.5	127.9	128.1	135.1	135.3	139.8	140	127.4	127.6
Annual Energy DHW [GJ/yr]	31.7	31.7	31.7	31.7	31.7	31.7	31	31	31	31
Annual Energy Space Heating [GJ/yr]	71.7	71.9	66.6	66.7	69.5	69.6	71.5	71.7	66.4	66.5
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total Energy [GJ/yr]	210.6	210.7	206	206.1	208.5	208.6	209.6	209.8	205.1	205.2
Design Heating Load [W]	22335.3	22366.2	22072.2	22103.1	22072.2	22103.1	22335.3	22366.2	22072.2	22103.1
Annual Energy Electricity [kWh/yr]	58490.2	58519.8	57212.9	57242.1	57905.2	57934.9	58234.3	58264	56959.5	56988.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,213.05	$ 8,217.24	$ 8,032.31	$ 8,036.44	$ 8,130.27	$ 8,134.47	$ 8,176.84	$ 8,181.04	$ 7,996.45	$ 8,000.59
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58336	58606	39004	39274	38950	39220	58337	58607	39005	39275
Upgrade Package List	Pkg2210101011	Pkg2210101111	Pkg2110101031	Pkg2110101131	Pkg2110101021	Pkg2110101121	Pkg2210101011	Pkg2210101111	Pkg2110101031	Pkg2110101131
GHGI [kg/m2]	1.4	1.4	1.37	1.37	1.39	1.39	1.4	1.4	1.37	1.37
% ICC	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.2%	3.2%	3.2%	3.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	85	85.1	77.5	77.6	81.9	82	84.7	84.8	77.2	77.3
Output: MEUI [kWh/(m2 * yr)]	65.3	65.4	62.4	62.5	64	64.1	64.7	64.8	61.9	62
Output: Better than ERS (%)	1080.0%	1070.0%	1270.0%	1270.0%	1170.0%	1160.0%	1120.0%	1110.0%	1310.0%	1310.0%
Output: Better than Envelope (%)	2250.0%	2240.0%	2940.0%	2930.0%	2540.0%	2530.0%	2280.0%	2270.0%	2970.0%	2950.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31910	31881	33188	33159	32496	32466	32166	32137	33441	33412
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,499.38	$ 4,495.21	$ 4,679.48	$ 4,675.36	$ 4,581.87	$ 4,577.68	$ 4,535.46	$ 4,531.27	$ 4,715.21	$ 4,711.09
Annual savings in carbon tax for electricity [$/year]	$ 15.96	$ 15.94	$ 16.59	$ 16.58	$ 16.25	$ 16.23	$ 16.08	$ 16.07	$ 16.72	$ 16.71
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,515.34	$ 4,511.15	$ 4,696.07	$ 4,691.94	$ 4,598.11	$ 4,593.91	$ 4,551.55	$ 4,547.34	$ 4,731.93	$ 4,727.8
Annual savings in GHG from electricity savings [kg CO2e/year]	351	350.7	365.1	364.7	357.5	357.1	353.8	353.5	367.9	367.5
Annual savings in natural gas [m3/year]	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24	61.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41
Annual savings in carbon tax for natural gas [$/year]	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2
Net Present Value [$]	$ 66,911.29	$ 66,835.15	$ 69,798.74	$ 69,723.52	$ 67,719.51	$ 67,643.01	$ 65,370.05	$ 65,293.55	$ 68,251.12	$ 68,175.89
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 25	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$.	$.	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	3.87	3.87	3.87	3.87	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$ 2,200.

QUADPLEX Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 28,981.84	$ 28,981.84	$ 34,421.84	$ 34,421.84	$ 31,753.52	$ 31,753.52	$ 40,318.	$ 29,278.86	$ 40,112.37	$ 29,278.86
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,530.72	$ 43,530.72	$ 51,701.6	$ 51,701.6	$ 47,693.79	$ 47,693.79	$ 60,557.64	$ 43,976.85	$ 60,248.78	$ 43,976.85
Net Present Value [$]	$ 87,231.7	$ 87,161.04	$ 86,528.69	$ 86,458.94	$ 86,009.26	$ 85,937.68	$ 85,848.62	$ 85,628.29	$ 85,569.12	$ 85,554.71
Incremental dollars per GHG saving	$ 58.49	$ 58.53	$ 66.75	$ 66.79	$ 63.24	$ 63.28	$ 74.94	$ 59.77	$ 74.85	$ 59.8
Auxiliary Energy Required Heating [GJ/yr]	100.2	100.4	88.7	88.9	98	98.2	74.8	106.4	76.2	106.6
Annual Energy DHW [GJ/yr]	61.2	61.2	61.2	61.2	61.2	61.2	61.2	61.2	61.2	61.2
Annual Energy Space Heating [GJ/yr]	54.3	54.4	48.6	48.7	53.3	53.4	41.3	56.9	42	57
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.3	2.3	1.3	1.3	1.3	1.3	1.3	2.3	1.3	2.3
Total Energy [GJ/yr]	224.2	224.3	217.5	217.6	222	222.1	210.2	226	210.9	226.1
Design Heating Load [W]	20844.9	20875.8	20167.8	20198.7	21395	21425.9	17562.1	20844.9	17778.1	20875.8
Annual Energy Electricity [kWh/yr]	45257.6	45285	43417.6	43444.7	44655.8	44683.6	41391.5	45765	41579.9	45793.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,340.64	$ 6,344.51	$ 6,080.28	$ 6,084.11	$ 6,255.48	$ 6,259.41	$ 5,793.58	$ 6,412.43	$ 5,820.24	$ 6,416.48
Annual Energy Natural Gas [m3/yr]	1644.3	1644.3	1644.3	1644.3	1644.3	1644.3	1644.3	1644.3	1644.3	1644.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 709.29
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58441	58711	58459	58729	39019	39289	221845	58387	221629	58657
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101032	Pkg2210101132	Pkg2110101032	Pkg2110101132	Pkg3310211232	Pkg2210101021	Pkg3310211132	Pkg2210101121
GHGI [kg/m2]	7.95	7.95	7.91	7.91	7.94	7.94	7.86	7.96	7.86	7.97
% ICC	3.0%	3.0%	3.5%	3.5%	3.2%	3.2%	4.1%	3.0%	4.1%	3.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	60.7	60.8	53.7	53.9	59.4	59.5	45.3	64.5	46.1	64.6
Output: MEUI [kWh/(m2 * yr)]	73.4	73.4	69.4	69.4	72.1	72.1	64.9	74.5	65.4	74.6
Output: Better than ERS (%)	500.0%	500.0%	780.0%	780.0%	590.0%	590.0%	1090.0%	420.0%	1060.0%	420.0%
Output: Better than Envelope (%)	4470.0%	4460.0%	5100.0%	5090.0%	4590.0%	4580.0%	5870.0%	4120.0%	5790.0%	4110.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	45143	45116	46983	46956	45745	45717	49009	44636	48821	44607
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,365.18	$ 6,361.31	$ 6,624.62	$ 6,620.8	$ 6,450.03	$ 6,446.11	$ 6,910.3	$ 6,293.63	$ 6,883.73	$ 6,289.6
Annual savings in carbon tax for electricity [$/year]	$ 22.57	$ 22.56	$ 23.49	$ 23.48	$ 22.87	$ 22.86	$ 24.5	$ 22.32	$ 24.41	$ 22.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,387.75	$ 6,383.87	$ 6,648.11	$ 6,644.27	$ 6,472.9	$ 6,468.97	$ 6,934.8	$ 6,315.95	$ 6,908.14	$ 6,311.9
Annual savings in GHG from electricity savings [kg CO2e/year]	496.6	496.3	516.8	516.5	503.2	502.9	539.1	491	537	490.7
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Net Present Value [$]	$ 87,231.7	$ 87,161.04	$ 86,528.69	$ 86,458.94	$ 86,009.26	$ 85,937.68	$ 85,848.62	$ 85,628.29	$ 85,569.12	$ 85,554.71
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.64	5.02	4.93	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR32	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 205.63	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,069.22	$ 3,366.24
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	7.04	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 10,191.5	$ 8,412.62	$ 10,191.5	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	NA	BC EffR10	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,911.65	$.	$ 2,911.65	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$.	$ 5,440.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 44,335.2	$ 44,721.77	$ 44,927.4	$ 45,174.	$ 45,889.57	$ 46,095.2
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 66,591.47	$ 67,172.1	$ 67,480.95	$ 67,851.35	$ 68,926.13	$ 69,234.99
Net Present Value [$]	$ 68,916.95	$ 68,326.98	$ 68,593.52	$ 68,097.14	$ 67,264.53	$ 67,527.05
Incremental dollars per GHG saving	$ 12.41	$ 12.52	$ 12.57	$ 12.65	$ 12.85	$ 12.9
Auxiliary Energy Required Heating [GJ/yr]	89.9	90.1	88.7	90	90.2	88.8
Annual Energy DHW [GJ/yr]	31.7	31.8	31.8	31.7	31.7	31.7
Annual Energy Space Heating [GJ/yr]	48	48.1	47.4	48	48.1	47.5
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	186.3	186.6	186	186.3	186.5	185.8
Design Heating Load [W]	17481.3	17621.3	17405.3	17389.8	17525	17309
Annual Energy Electricity [kWh/yr]	51757.8	51836.8	51653.4	51750.4	51795.9	51614
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,260.41	$ 7,271.59	$ 7,245.64	$ 7,259.37	$ 7,265.8	$ 7,240.07
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	225736	229408	229624	221866	225538	225754
Upgrade Package List	Pkg3310311232	Pkg3310411132	Pkg3310411232	Pkg3310211233	Pkg3310311133	Pkg3310311233
GHGI [kg/m2]	1.24	1.24	1.24	1.24	1.24	1.24
% ICC	4.5%	4.6%	4.6%	4.6%	4.7%	4.7%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	54.4	54.6	53.8	54.5	54.6	53.8
Output: MEUI [kWh/(m2 * yr)]	50.5	50.7	50.3	50.5	50.6	50.2
Output: Better than ERS (%)	2110.0%	2090.0%	2120.0%	2110.0%	2100.0%	2130.0%
Output: Better than Envelope (%)	5040.0%	5020.0%	5100.0%	5030.0%	5020.0%	5100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	38643	38564	38747	38650	38605	38787
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,448.65	$ 5,437.51	$ 5,463.37	$ 5,449.69	$ 5,443.28	$ 5,468.92
Annual savings in carbon tax for electricity [$/year]	$ 19.32	$ 19.28	$ 19.37	$ 19.33	$ 19.3	$ 19.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,467.97	$ 5,456.79	$ 5,482.74	$ 5,469.02	$ 5,462.58	$ 5,488.32
Annual savings in GHG from electricity savings [kg CO2e/year]	425.1	424.2	426.2	425.2	424.7	426.7
Annual savings in natural gas [m3/year]	61.24	61.24	61.24	61.24	61.24	61.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41
Annual savings in carbon tax for natural gas [$/year]	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2
Net Present Value [$]	$ 68,916.95	$ 68,326.98	$ 68,593.52	$ 68,097.14	$ 67,264.53	$ 67,527.05
ECM Details Envelope Components						
Attic Ceiling RSI	5.64	4.93	5.64	5.64	4.93	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR32
Flat Ceiling Cost of Upgrade	$ 205.63	$.	$ 205.63	$ 205.63	$.	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,832.85	$ 4,425.05	$ 4,425.05	$ 2,911.65	$ 3,832.85	$ 3,832.85
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 7,200.	$ 7,200.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6
Summary Data						
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 44,335.2	$ 44,721.77	$ 44,927.4	$ 45,174.	$ 45,889.57	$ 46,095.2
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 66,591.47	$ 67,172.1	$ 67,480.95	$ 67,851.35	$ 68,926.13	$ 69,234.99
Net Present Value [$]	$ 68,916.95	$ 68,326.98	$ 68,593.52	$ 68,097.14	$ 67,264.53	$ 67,527.05
Incremental dollars per GHG saving	$ 12.41	$ 12.52	$ 12.57	$ 12.65	$ 12.85	$ 12.9
Auxiliary Energy Required Heating [GJ/yr]	89.9	90.1	88.7	90	90.2	88.8
Annual Energy DHW [GJ/yr]	31.7	31.8	31.8	31.7	31.7	31.7
Annual Energy Space Heating [GJ/yr]	48	48.1	47.4	48	48.1	47.5
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	186.3	186.6	186	186.3	186.5	185.8
Design Heating Load [W]	17481.3	17621.3	17405.3	17389.8	17525	17309
Annual Energy Electricity [kWh/yr]	51757.8	51836.8	51653.4	51750.4	51795.9	51614
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,260.41	$ 7,271.59	$ 7,245.64	$ 7,259.37	$ 7,265.8	$ 7,240.07
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5
HTAP Run Number	225736	229408	229624	221866	225538	225754
Upgrade Package List	Pkg3310311232	Pkg3310411132	Pkg3310411232	Pkg3310211233	Pkg3310311133	Pkg3310311233
GHGI [kg/m2]	1.24	1.24	1.24	1.24	1.24	1.24
% ICC	4.5%	4.6%	4.6%	4.6%	4.7%	4.7%
Step Code Target Values						
Target ACH@50Pa	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60
Target Output: Better than ERS (%)						
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package						
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	54.4	54.6	53.8	54.5	54.6	53.8
Output: MEUI [kWh/(m2 * yr)]	50.5	50.7	50.3	50.5	50.6	50.2
Output: Better than ERS (%)	2110.0%	2090.0%	2120.0%	2110.0%	2100.0%	2130.0%
Output: Better than Envelope (%)	5040.0%	5020.0%	5100.0%	5030.0%	5020.0%	5100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:						
Annual savings in electricity [kWh/yr]	38643	38564	38747	38650	38605	38787
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,448.65	$ 5,437.51	$ 5,463.37	$ 5,449.69	$ 5,443.28	$ 5,468.92
Annual savings in carbon tax for electricity [$/year]	$ 19.32	$ 19.28	$ 19.37	$ 19.33	$ 19.3	$ 19.39
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,467.97	$ 5,456.79	$ 5,482.74	$ 5,469.02	$ 5,462.58	$ 5,488.32
Annual savings in GHG from electricity savings [kg CO2e/year]	425.1	424.2	426.2	425.2	424.7	426.7
Annual savings in natural gas [m3/year]	61.24	61.24	61.24	61.24	61.24	61.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41	$ 567.41
Annual savings in carbon tax for natural gas [$/year]	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62	$ 141.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03	$ 709.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	3147.2	3147.2	3147.2	3147.2	3147.2	3147.2
Net Present Value [$]	$ 68,916.95	$ 68,326.98	$ 68,593.52	$ 68,097.14	$ 67,264.53	$ 67,527.05
ECM Details Envelope Components						
Attic Ceiling RSI	5.64	4.93	5.64	5.64	4.93	5.64
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR32
Flat Ceiling Cost of Upgrade	$ 205.63	$.	$ 205.63	$ 205.63	$.	$ 205.63
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 3,832.85	$ 4,425.05	$ 4,425.05	$ 2,911.65	$ 3,832.85	$ 3,832.85
Exposed Floor Code	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components						
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 7,200.	$ 7,200.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.

QUADPLEX Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR50 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR50 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTanklessd0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 58,518.13	$ 58,323.92	$ 59,110.33	$ 58,916.12	$ 57,963.92	$ 58,718.13	$ 58,556.12	$ 60,518.13	$ 60,718.13	$ 59,310.33
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 87,894.23	$ 87,602.53	$ 88,783.72	$ 88,492.01	$ 87,061.81	$ 88,194.63	$ 87,951.29	$ 90,898.23	$ 91,198.63	$ 89,084.12
Net Present Value [$]	$ 74,447.77	$ 74,270.6	$ 73,991.6	$ 73,821.73	$ 72,995.29	$ 72,745.06	$ 72,697.24	$ 72,597.67	$ 72,569.08	$ 72,447.18
Incremental dollars per GHG saving	$ 103.19	$ 103.14	$ 104.14	$ 104.07	$ 85.29	$ 92.7	$ 86.01	$ 106.6	$ 94.7	$ 93.45
Auxiliary Energy Required Heating [GJ/yr]	56.1	57.1	55.2	56.2	62.7	60.6	61.7	55.6	56.1	59.7
Annual Energy DHW [GJ/yr]	61.2	61.2	61.2	61.2	58.8	59.8	58.8	61.2	59.8	59.8
Annual Energy Space Heating [GJ/yr]	31.8	32.3	31.4	31.9	35.4	34.4	35	31.6	31.8	34
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	200.7	201.3	200.5	201.1	201.9	201.8	201.5	200.5	199.3	201.4
Design Heating Load [W]	14517	14685	14441	14609	15985.8	15645.4	15909.7	14480.1	14517	15569.3
Annual Energy Electricity [kWh/yr]	38750.4	38894.7	38697.6	38839	39739.8	39460.4	39625.5	38692.2	38751.9	39346.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 5,419.87	$ 5,440.29	$ 5,412.4	$ 5,432.4	$ 5,559.87	$ 5,520.33	$ 5,543.69	$ 5,411.63	$ 5,420.08	$ 5,504.16
Annual Energy Natural Gas [m3/yr]	1644.3	1644.3	1644.3	1644.3	1579.8	1605.5	1579.8	1644.3	1605.5	1605.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 709.29	$ 709.29	$ 709.29	$ 709.29	$ 681.47	$ 692.56	$ 681.47	$ 709.29	$ 692.56	$ 692.56
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	3263	3119	4991	4847	225843	238118	229731	3281	3264	242870
Upgrade Package List	Pkg4320312353	Pkg4320312253	Pkg4320412353	Pkg4320412253	Pkg3310311252	Pkg3320312353	Pkg3310411252	Pkg4320312354	Pkg4320312353	Pkg3320412353
GHGI [kg/m2]	7.8	7.8	7.8	7.8	7.55	7.65	7.55	7.79	7.63	7.65
% ICC	6.0%	5.9%	6.0%	6.0%	5.9%	6.0%	6.0%	6.2%	6.2%	6.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	34	34.6	33.4	34	38	36.7	37.4	33.7	34	36.2
Output: MEUI [kWh/(m2 * yr)]	59.2	59.5	59	59.3	59.9	59.9	59.6	59.1	58.3	59.6
Output: Better than ERS (%)	1500.0%	1470.0%	1500.0%	1480.0%	1440.0%	1450.0%	1460.0%	1500.0%	1560.0%	1470.0%
Output: Better than Envelope (%)	6900.0%	6850.0%	6950.0%	6900.0%	6540.0%	6650.0%	6590.0%	6930.0%	6900.0%	6700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	51650	51506	51703	51562	50661	50940	50775	51708	51649	51055
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,282.69	$ 7,262.35	$ 7,290.14	$ 7,270.2	$ 7,143.19	$ 7,182.58	$ 7,159.3	$ 7,290.9	$ 7,282.48	$ 7,198.7
Annual savings in carbon tax for electricity [$/year]	$ 25.83	$ 25.75	$ 25.85	$ 25.78	$ 25.33	$ 25.47	$ 25.39	$ 25.85	$ 25.82	$ 25.53
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,308.52	$ 7,288.1	$ 7,315.99	$ 7,295.98	$ 7,168.52	$ 7,208.05	$ 7,184.69	$ 7,316.75	$ 7,308.31	$ 7,224.23
Annual savings in GHG from electricity savings [kg CO2e/year]	568.2	566.6	568.7	567.2	557.3	560.3	558.5	568.8	568.1	561.6
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	2.38	1.42	2.38	0.02	1.42	1.42
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ 22.06	$ 13.19	$ 22.06	$ .21	$ 13.19	$ 13.19
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ 5.51	$ 3.29	$ 5.51	$ .05	$ 3.29	$ 3.29
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ 27.56	$ 16.48	$ 27.56	$ .26	$ 16.48	$ 16.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	122.3	73.1	122.3	1.1	73.1	73.1
Net Present Value [$]	$ 74,447.77	$ 74,270.6	$ 73,991.6	$ 73,821.73	$ 72,995.29	$ 72,745.06	$ 72,697.24	$ 72,597.67	$ 72,569.08	$ 72,447.18
ECM Details Envelope Components										
Attic Ceiling RSI	6.34	5.64	6.34	5.64	5.64	6.34	5.64	6.34	6.34	6.34
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR36	UsrSpecR32	UsrSpecR36	UsrSpecR32	UsrSpecR32	UsrSpecR36	UsrSpecR32	UsrSpecR36	UsrSpecR36	UsrSpecR36
Flat Ceiling Cost of Upgrade	$ 399.84	$ 205.63	$ 399.84	$ 205.63	$ 205.63	$ 399.84	$ 205.63	$ 399.84	$ 399.84	$ 399.84
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35
Window Cost of Upgrade	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94	$ 16,393.94
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 4,425.05	$ 3,832.85	$ 3,832.85	$ 4,425.05	$ 3,832.85	$ 3,832.85	$ 4,425.05
Exposed Floor Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95	BCGasTanklessd0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 7,200.	$ 7,200.	$ 7,200.	$ 7,200.	$ 5,440.	$ 7,200.	$ 5,440.	$ 9,200.	$ 7,200.	$ 7,200.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 3,400.	$ 2,200.	$ 3,400.	$.	$ 2,200.	$ 2,200.

QUADPLEX Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 20,844.3	$ 20,844.3	$ 21,677.84	$ 21,821.84	$ 21,821.84	$ 22,249.52	$ 22,249.52	$ 22,512.62	$ 22,512.62	$ 22,877.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,308.14	$ 31,308.14	$ 32,560.12	$ 32,776.4	$ 32,776.4	$ 33,418.78	$ 33,418.78	$ 33,813.96	$ 33,813.96	$ 34,362.52
Net Present Value [$]	$ 99,352.6	$ 99,255.28	$ 57,028.4	$ 89,053.29	$ 88,877.82	$ 58,256.28	$ 58,074.24	$ 93,236.15	$ 93,137.55	$ 56,411.4
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 6.22	$ 46.18	$ 46.26	$ 6.37	$ 6.37	$ 999,999.	$ 999,999.	$ 6.56
Auxiliary Energy Required Heating [GJ/yr]	172.1	172.4	156	123.9	124.2	153.7	154	181.4	181.6	155.7
Annual Energy DHW [GJ/yr]	80.7	80.7	31.6	62.4	62.4	32.4	32.4	80.7	80.7	31.1
Annual Energy Space Heating [GJ/yr]	99.2	99.4	155.9	123.9	124.2	153.7	153.9	105.4	105.6	155.6
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	1.3	1.3	1.3	1.3	2.4	2.4	2.4
Total Energy [GJ/yr]	289.7	289.8	292.4	290.2	290.4	289.9	290.1	295.9	296.1	291.6
Design Heating Load [W]	25788.7	25821.8	21497.6	20772.9	20806	22086.3	22119.3	28307.2	28340.2	21497.6
Annual Energy Electricity [kWh/yr]	58045	58082.8	81216.1	63266	63334.2	80517.1	80587.8	59772.8	59811.1	80989.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,150.05	$ 8,155.4	$ 11,428.76	$ 8,888.82	$ 8,898.47	$ 11,329.85	$ 11,339.86	$ 8,394.54	$ 8,399.96	$ 11,396.71
Annual Energy Natural Gas [m3/yr]	2168.3	2168.3	0	1676.5	1676.5	0	0	2168.3	2168.3	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 935.33	$ 935.33	$.	$ 723.18	$ 723.18	$.	$.	$ 935.33	$ 935.33	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	38890	39160	58436	58450	58720	39013	39283	19450	19720	58437
Upgrade Package List	Pkg2110101011	Pkg2110101111	Pkg2210101031	Pkg2210101032	Pkg2210101132	Pkg2110101032	Pkg2110101132	Pkg1210101011	Pkg1210101111	Pkg2210101031
GHGI [kg/m2]	10.45	10.45	1.95	8.52	8.52	1.93	1.93	10.49	10.49	1.94
% ICC	2.1%	2.1%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	104.3	104.4	94.5	75.1	75.2	93.1	93.3	109.9	110	94.3
Output: MEUI [kWh/(m2 * yr)]	112.9	113	115	113.7	113.9	113.5	113.7	116.7	116.8	114.5
Output: Better than ERS (%)	80.0%	80.0%	170.0%	90.0%	100.0%	80.0%	90.0%	290.0%	300.0%	140.0%
Output: Better than Envelope (%)	1560.0%	1540.0%	2350.0%	3920.0%	3910.0%	2460.0%	2450.0%	1100.0%	1090.0%	2360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	48291	48253	25120	43070	43002	25819	25748	46563	46525	25346
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,809.	$ 6,803.67	$ 3,541.88	$ 6,072.84	$ 6,063.23	$ 3,640.44	$ 3,630.47	$ 6,565.38	$ 6,559.98	$ 3,573.81
Annual savings in carbon tax for electricity [$/year]	$ 24.15	$ 24.13	$ 12.56	$ 21.53	$ 21.5	$ 12.91	$ 12.87	$ 23.28	$ 23.26	$ 12.67
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,833.15	$ 6,827.8	$ 3,554.44	$ 6,094.38	$ 6,084.73	$ 3,653.35	$ 3,643.34	$ 6,588.66	$ 6,583.25	$ 3,586.49
Annual savings in GHG from electricity savings [kg CO2e/year]	531.2	530.8	276.3	473.8	473	284	283.2	512.2	511.8	278.8
Annual savings in natural gas [m3/year]	18.35	18.35	62.44	0.03	0.03	62.44	62.44	18.35	18.35	62.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 170.01	$ 170.01	$ 578.49	$ .24	$ .24	$ 578.49	$ 578.49	$ 170.01	$ 170.01	$ 578.49
Annual savings in carbon tax for natural gas [$/year]	$ 42.43	$ 42.43	$ 144.39	$ .06	$ .06	$ 144.39	$ 144.39	$ 42.43	$ 42.43	$ 144.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 212.45	$ 212.45	$ 722.88	$ .3	$ .3	$ 722.88	$ 722.88	$ 212.45	$ 212.45	$ 722.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	943	943	3208.6	1.3	1.3	3208.6	3208.6	943	943	3208.6
Net Present Value [$]	$ 99,352.6	$ 99,255.28	$ 57,028.4	$ 89,053.29	$ 88,877.82	$ 58,256.28	$ 58,074.24	$ 93,236.15	$ 93,137.55	$ 56,411.4
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	5.02	4.93	5.02	4.93	5.02	4.93	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$.	$.	$ 3,069.22
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	BC CCASHP	BC CCASHP	NBC elec heat
Ventilation System Code	NA	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$.	$.	$.	$.	$.	$ 12,600.	$ 12,600.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$ 5,496.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$.	$.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$.	$.	$.	$.	$.	$.	$ 3,400.

QUADPLEX Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 21,677.84	$ 22,249.52	$ 22,249.52	$ 22,877.84	$ 22,877.84	$ 24,009.52	$ 24,009.52	$ 24,449.52	$ 24,449.52	$ 24,917.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 32,560.12	$ 33,418.78	$ 33,418.78	$ 34,362.52	$ 34,362.52	$ 36,062.3	$ 36,062.3	$ 36,723.18	$ 36,723.18	$ 37,426.6
Net Present Value [$]	$ 57,028.4	$ 58,256.28	$ 58,074.24	$ 56,411.4	$ 56,205.44	$ 57,468.36	$ 57,287.06	$ 56,932.51	$ 56,750.84	$ 64,147.36
Incremental dollars per GHG saving	$ 6.22	$ 6.37	$ 6.37	$ 6.56	$ 6.56	$ 6.87	$ 6.87	$ 6.99	$ 6.99	$ 7.06
Auxiliary Energy Required Heating [GJ/yr]	156	153.7	154	155.7	156	152.4	152.6	153.2	153.5	141.7
Annual Energy DHW [GJ/yr]	31.6	32.4	32.4	31.1	31.1	32.4	32.4	31.6	31.6	32.4
Annual Energy Space Heating [GJ/yr]	155.9	153.7	153.9	155.6	155.9	152.3	152.6	153.2	153.5	141.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	1.3	1.3	2.4	2.4	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	292.4	289.9	290.1	291.6	291.9	288.5	288.8	288.6	288.9	277.9
Design Heating Load [W]	21497.6	22086.3	22119.3	21497.6	21530.6	21901.8	21934.9	22086.3	22119.3	20772.9
Annual Energy Electricity [kWh/yr]	81216.1	80517.1	80587.8	80989.6	81069.6	80139.5	80209.9	80176.7	80247.3	77192.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,428.76	$ 11,329.85	$ 11,339.86	$ 11,396.71	$ 11,408.03	$ 11,276.42	$ 11,286.39	$ 11,281.69	$ 11,291.68	$ 10,859.4
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58436	39013	39283	58437	58707	39031	39301	39014	39284	58453
Upgrade Package List	Pkg2210101031	Pkg2110101032	Pkg2110101132	Pkg2210101031	Pkg2210101131	Pkg2110101033	Pkg2110101133	Pkg2110101032	Pkg2110101132	Pkg2210101032
GHGI [kg/m2]	1.95	1.93	1.93	1.94	1.94	1.92	1.92	1.92	1.93	1.85
% ICC	2.2%	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	94.5	93.1	93.3	94.3	94.5	92.3	92.5	92.8	93	85.9
Output: MEUI [kWh/(m2 * yr)]	115	113.5	113.7	114.5	114.7	112.7	112.8	112.8	112.9	106.3
Output: Better than ERS (%)	170.0%	80.0%	90.0%	140.0%	150.0%	30.0%	50.0%	40.0%	50.0%	330.0%
Output: Better than Envelope (%)	2350.0%	2460.0%	2450.0%	2360.0%	2350.0%	2530.0%	2520.0%	2490.0%	2470.0%	3050.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	25120	25819	25748	25346	25266	26196	26126	26159	26088	29144
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,541.88	$ 3,640.44	$ 3,630.47	$ 3,573.81	$ 3,562.53	$ 3,693.68	$ 3,683.75	$ 3,688.43	$ 3,678.48	$ 4,109.23
Annual savings in carbon tax for electricity [$/year]	$ 12.56	$ 12.91	$ 12.87	$ 12.67	$ 12.63	$ 13.1	$ 13.06	$ 13.08	$ 13.04	$ 14.57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,554.44	$ 3,653.35	$ 3,643.34	$ 3,586.49	$ 3,575.17	$ 3,706.78	$ 3,696.81	$ 3,701.51	$ 3,691.52	$ 4,123.81
Annual savings in GHG from electricity savings [kg CO2e/year]	276.3	284	283.2	278.8	277.9	288.2	287.4	287.8	287	320.6
Annual savings in natural gas [m3/year]	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49
Annual savings in carbon tax for natural gas [$/year]	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6
Net Present Value [$]	$ 57,028.4	$ 58,256.28	$ 58,074.24	$ 56,411.4	$ 56,205.44	$ 57,468.36	$ 57,287.06	$ 56,932.51	$ 56,750.84	$ 64,147.36
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	3.87	3.87	5.28	5.28	3.87	3.87	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$ 5,440.	$ 5,440.	$.	$.	$ 7,200.	$ 7,200.	$ 5,440.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$ 2,200.	$.	$.	$ 3,400.	$ 3,400.	$.	$.	$ 2,200.	$ 2,200.	$.

QUADPLEX Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 37,918.	$ 28,981.84	$ 28,981.84	$ 37,712.37	$ 38,839.2	$ 39,431.4	$ 31,753.52	$ 31,753.52	$ 38,633.57	$ 29,278.86
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,952.84	$ 43,530.72	$ 43,530.72	$ 56,643.98	$ 58,336.48	$ 59,225.96	$ 47,693.79	$ 47,693.79	$ 58,027.62	$ 43,976.85
Net Present Value [$]	$ 107,036.64	$ 106,906.7	$ 106,809.57	$ 106,603.4	$ 106,510.01	$ 106,284.62	$ 106,174.68	$ 106,075.9	$ 106,037.15	$ 105,908.37
Incremental dollars per GHG saving	$ 999,999.	$ 50.03	$ 50.06	$ 999,999.	$ 999,999.	$ 999,999.	$ 53.99	$ 54.04	$ 999,999.	$ 50.81
Auxiliary Energy Required Heating [GJ/yr]	106	138.1	138.3	107.7	104.8	103.7	135.4	135.7	106.5	143.9
Annual Energy DHW [GJ/yr]	80.8	62.4	62.4	80.8	80.8	80.8	62.4	62.4	80.8	62.4
Annual Energy Space Heating [GJ/yr]	63.6	81.3	81.4	64.6	63	62.5	80	80.1	64	84
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	2.4	2.4	1.3	1.3	1.3	1.3	1.3	1.3	2.4
Total Energy [GJ/yr]	255.1	255.2	255.3	256	254.5	254	252.4	252.5	255.5	256.2
Design Heating Load [W]	19321.6	22337.2	22370.2	19552.7	19233.6	19151.1	22925.9	22958.9	19464.8	22337.2
Annual Energy Electricity [kWh/yr]	48427.9	53550	53587.7	48676.1	48274.7	48132.2	52757.7	52796.1	48538.2	53822.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,789.23	$ 7,514.01	$ 7,519.34	$ 6,824.35	$ 6,767.56	$ 6,747.39	$ 7,401.9	$ 7,407.33	$ 6,804.84	$ 7,552.55
Annual Energy Natural Gas [m3/yr]	2168.4	1676.5	1676.5	2168.4	2168.4	2168.4	1676.5	1676.5	2168.4	1676.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 935.37	$ 723.18	$ 723.18	$ 935.37	$ 935.37	$ 935.37	$ 723.18	$ 723.18	$ 935.37	$ 723.18
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	221842	58441	58711	221626	225730	229618	39019	39289	225514	58387
Upgrade Package List	Pkg3310211232	Pkg2210101031	Pkg2210101131	Pkg3310211132	Pkg3310311232	Pkg3310411232	Pkg2110101032	Pkg2110101132	Pkg3310311132	Pkg2210101021
GHGI [kg/m2]	10.22	8.29	8.29	10.22	10.21	10.21	8.27	8.27	10.22	8.29
% ICC	3.9%	3.0%	3.0%	3.8%	4.0%	4.0%	3.2%	3.2%	3.9%	3.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.2	83.6	83.8	65.3	63.5	62.8	82.1	82.2	64.5	87.2
Output: MEUI [kWh/(m2 * yr)]	91.8	91.8	91.9	92.3	91.4	91.1	90.2	90.3	92	92.6
Output: Better than ERS (%)	1130.0%	1120.0%	1120.0%	1100.0%	1150.0%	1170.0%	1220.0%	1220.0%	1110.0%	1090.0%
Output: Better than Envelope (%)	4800.0%	3230.0%	3220.0%	4720.0%	4860.0%	4910.0%	3360.0%	3340.0%	4780.0%	2940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	57908	52786	52748	57660	58061	58204	53578	53540	57798	52513
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,165.01	$ 7,442.8	$ 7,437.48	$ 8,130.02	$ 8,186.62	$ 8,206.71	$ 7,554.51	$ 7,549.1	$ 8,149.46	$ 7,404.39
Annual savings in carbon tax for electricity [$/year]	$ 28.95	$ 26.39	$ 26.37	$ 28.83	$ 29.03	$ 29.1	$ 26.79	$ 26.77	$ 28.9	$ 26.26
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,193.97	$ 7,469.19	$ 7,463.86	$ 8,158.85	$ 8,215.65	$ 8,235.81	$ 7,581.3	$ 7,575.87	$ 8,178.36	$ 7,430.65
Annual savings in GHG from electricity savings [kg CO2e/year]	637	580.6	580.2	634.3	638.7	640.2	589.4	588.9	635.8	577.6
Annual savings in natural gas [m3/year]	18.35	0.03	0.03	18.35	18.35	18.35	0.03	0.03	18.35	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 170.05	$ .24	$ .24	$ 170.05	$ 170.05	$ 170.05	$ .24	$ .24	$ 170.05	$ .24
Annual savings in carbon tax for natural gas [$/year]	$ 42.44	$ .06	$ .06	$ 42.44	$ 42.44	$ 42.44	$ .06	$ .06	$ 42.44	$ .06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 212.49	$ .3	$ .3	$ 212.49	$ 212.49	$ 212.49	$ .3	$ .3	$ 212.49	$ .3
Annual savings in GHG from natural gas savings [kg CO2e/year]	943.2	1.3	1.3	943.2	943.2	943.2	1.3	1.3	943.2	1.3
Net Present Value [$]	$ 107,036.64	$ 106,906.7	$ 106,809.57	$ 106,603.4	$ 106,510.01	$ 106,284.62	$ 106,174.68	$ 106,075.9	$ 106,037.15	$ 105,908.37
ECM Details Envelope Components										
Attic Ceiling RSI	5.64	5.02	4.93	4.93	5.64	5.64	5.02	4.93	4.93	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR28	UsrSpecR32	UsrSpecR32	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR28	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$ 205.63	$.	$.	$.	$ 205.63	$ 205.63	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24
Above Grade Wall Code	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 22 eff	BC R 22 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	5.28	5.28	7.04	7.04	7.04	3.87	3.87	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 8,412.62	$ 8,412.62	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 5,744.3	$ 5,744.3	$ 10,191.5	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	NA	NA	BC EffR10	BC EffR14	BC EffR20	NA	NA	BC EffR14	NA
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$.	$.	$ 2,911.65	$ 3,832.85	$ 4,425.05	$.	$.	$ 3,832.85	$.
Exposed Floor Code	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NA	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA
DHW System Code	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$.
DHW System Cost of Upgrade	$.	$ 2,400.	$ 2,400.	$.	$.	$.	$ 2,400.	$ 2,400.	$.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 32,077.84	$ 32,077.84	$ 32,374.86	$ 33,513.52	$ 33,513.52	$ 33,953.52	$ 33,953.52	$ 34,277.84	$ 34,277.84	$ 34,421.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 48,180.92	$ 48,180.92	$ 48,627.04	$ 50,337.31	$ 50,337.31	$ 50,998.19	$ 50,998.19	$ 51,485.32	$ 51,485.32	$ 51,701.6
Net Present Value [$]	$ 89,658.39	$ 89,553.96	$ 88,159.42	$ 104,907.66	$ 104,807.6	$ 104,308.78	$ 104,210.19	$ 88,148.38	$ 88,044.13	$ 107,649.94
Incremental dollars per GHG saving	$ 8.74	$ 8.75	$ 8.84	$ 56.78	$ 56.83	$ 51.02	$ 51.05	$ 9.34	$ 9.34	$ 56.82
Auxiliary Energy Required Heating [GJ/yr]	156.5	156.7	163.2	134.2	134.4	135.5	135.7	156	156.3	123.9
Annual Energy DHW [GJ/yr]	32.4	32.4	32.4	62.4	62.4	60.9	60.9	31.6	31.6	62.4
Annual Energy Space Heating [GJ/yr]	90.2	90.3	93.1	79.3	79.4	80	80.1	90	90.1	73.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	1.3	1.3	1.3	1.3	2.4	2.4	1.3
Total Energy [GJ/yr]	232.2	232.4	233.9	251.7	251.8	250.9	251	231.2	231.4	246.6
Design Heating Load [W]	22337.2	22370.2	22337.2	22741.4	22774.5	22925.9	22958.9	22337.2	22370.2	21612.5
Annual Energy Electricity [kWh/yr]	64501.8	64542.4	64968.7	52566.2	52605.1	52759.7	52798	64233.8	64274.3	51148.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,063.69	$ 9,069.43	$ 9,129.76	$ 7,374.8	$ 7,380.31	$ 7,402.18	$ 7,407.6	$ 9,025.77	$ 9,031.5	$ 7,174.16
Annual Energy Natural Gas [m3/yr]	0	0	0	1676.5	1676.5	1636	1636	0	0	1676.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$ 723.18	$ 723.18	$ 705.71	$ 705.71	$.	$.	$ 723.18
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58444	58714	58390	39037	39307	39020	39290	58445	58715	58459
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101021	Pkg2110101033	Pkg2110101133	Pkg2110101032	Pkg2110101132	Pkg2210101031	Pkg2210101131	Pkg2210101032
GHGI [kg/m2]	1.55	1.55	1.56	8.26	8.26	8.1	8.1	1.54	1.54	8.23
% ICC	3.3%	3.3%	3.3%	3.4%	3.4%	3.5%	3.5%	3.5%	3.5%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	94.8	95	98.8	81.3	81.4	82.1	82.2	94.5	94.7	75.1
Output: MEUI [kWh/(m2 * yr)]	78.1	78.2	79.3	89.8	89.8	89.3	89.4	77.5	77.6	86.6
Output: Better than ERS (%)	1920.0%	1920.0%	1860.0%	1250.0%	1240.0%	1270.0%	1270.0%	1960.0%	1950.0%	1420.0%
Output: Better than Envelope (%)	2320.0%	2310.0%	2000.0%	3420.0%	3410.0%	3350.0%	3340.0%	2350.0%	2330.0%	3920.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	41834	41793	41367	53770	53731	53576	53538	42102	42062	55188
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,898.59	$ 5,892.87	$ 5,832.76	$ 7,581.51	$ 7,576.03	$ 7,554.23	$ 7,548.83	$ 5,936.38	$ 5,930.67	$ 7,781.45
Annual savings in carbon tax for electricity [$/year]	$ 20.92	$ 20.9	$ 20.68	$ 26.88	$ 26.87	$ 26.79	$ 26.77	$ 21.05	$ 21.03	$ 27.59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,919.51	$ 5,913.77	$ 5,853.44	$ 7,608.4	$ 7,602.89	$ 7,581.02	$ 7,575.6	$ 5,957.43	$ 5,951.7	$ 7,809.05
Annual savings in GHG from electricity savings [kg CO2e/year]	460.2	459.7	455	591.5	591	589.3	588.9	463.1	462.7	607.1
Annual savings in natural gas [m3/year]	62.44	62.44	62.44	0.03	0.03	1.48	1.48	62.44	62.44	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.49	$ 578.49	$ 578.49	$ .24	$ .24	$ 13.74	$ 13.74	$ 578.49	$ 578.49	$ .24
Annual savings in carbon tax for natural gas [$/year]	$ 144.39	$ 144.39	$ 144.39	$ .06	$ .06	$ 3.43	$ 3.43	$ 144.39	$ 144.39	$ .06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.88	$ 722.88	$ 722.88	$ .3	$ .3	$ 17.17	$ 17.17	$ 722.88	$ 722.88	$ .3
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.6	3208.6	3208.6	1.3	1.3	76.2	76.2	3208.6	3208.6	1.3
Net Present Value [$]	$ 89,658.39	$ 89,553.96	$ 88,159.42	$ 104,907.66	$ 104,807.6	$ 104,308.78	$ 104,210.19	$ 88,148.38	$ 88,044.13	$ 107,649.94
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	5.02	4.93	5.02	4.93	5.02	4.93	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,386.24	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	3.87	3.87	3.87	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	NA	NA	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 7,200.	$ 7,200.	$ 5,440.	$ 5,440.	$.	$.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$ 2,200.	$.

QUADPLEX Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 32,077.84	$ 32,077.84	$ 32,374.86	$ 34,277.84	$ 34,277.84	$ 34,574.86	$ 34,574.86	$ 34,849.52	$ 34,849.52	$ 34,989.49
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 48,180.92	$ 48,180.92	$ 48,627.04	$ 51,485.32	$ 51,485.32	$ 51,931.44	$ 51,931.44	$ 52,343.98	$ 52,343.98	$ 52,554.21
Net Present Value [$]	$ 89,658.39	$ 89,553.96	$ 88,159.42	$ 88,148.38	$ 88,044.13	$ 86,584.59	$ 86,477.41	$ 88,897.71	$ 88,793.63	$ 86,364.78
Incremental dollars per GHG saving	$ 8.74	$ 8.75	$ 8.84	$ 9.34	$ 9.34	$ 9.43	$ 9.43	$ 9.48	$ 9.48	$ 9.54
Auxiliary Energy Required Heating [GJ/yr]	156.5	156.7	163.2	156	156.3	162.7	162.9	153.7	154	157.5
Annual Energy DHW [GJ/yr]	32.4	32.4	32.4	31.6	31.6	31.6	31.6	32.4	32.4	32.4
Annual Energy Space Heating [GJ/yr]	90.2	90.3	93.1	90	90.1	92.9	93	88.6	88.8	90.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	2.4	2.4	2.4	2.4	1.3	1.3	2.4
Total Energy [GJ/yr]	232.2	232.4	233.9	231.2	231.4	233	233.2	229.4	229.5	232.7
Design Heating Load [W]	22337.2	22370.2	22337.2	22337.2	22370.2	22337.2	22370.2	22925.9	22958.9	22410.6
Annual Energy Electricity [kWh/yr]	64501.8	64542.4	64968.7	64233.8	64274.3	64725.9	64767.5	63720.7	63761.1	64650.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,063.69	$ 9,069.43	$ 9,129.76	$ 9,025.77	$ 9,031.5	$ 9,095.4	$ 9,101.29	$ 8,953.16	$ 8,958.88	$ 9,084.69
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58444	58714	58390	58445	58715	58391	58661	39022	39292	60604
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101021	Pkg2210101031	Pkg2210101131	Pkg2210101021	Pkg2210101121	Pkg2110101032	Pkg2110101132	Pkg2210201031
GHGI [kg/m2]	1.55	1.55	1.56	1.54	1.54	1.55	1.55	1.53	1.53	1.55
% ICC	3.3%	3.3%	3.3%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	94.8	95	98.8	94.5	94.7	98.5	98.7	93.1	93.3	95.4
Output: MEUI [kWh/(m2 * yr)]	78.1	78.2	79.3	77.5	77.6	78.7	78.8	76.4	76.5	78.4
Output: Better than ERS (%)	1920.0%	1920.0%	1860.0%	1960.0%	1950.0%	1900.0%	1890.0%	2020.0%	2020.0%	1910.0%
Output: Better than Envelope (%)	2320.0%	2310.0%	2000.0%	2350.0%	2330.0%	2020.0%	2010.0%	2460.0%	2450.0%	2280.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	41834	41793	41367	42102	42062	41610	41568	42615	42575	41686
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,898.59	$ 5,892.87	$ 5,832.76	$ 5,936.38	$ 5,930.67	$ 5,867.	$ 5,861.13	$ 6,008.73	$ 6,003.03	$ 5,877.67
Annual savings in carbon tax for electricity [$/year]	$ 20.92	$ 20.9	$ 20.68	$ 21.05	$ 21.03	$ 20.8	$ 20.78	$ 21.31	$ 21.29	$ 20.84
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,919.51	$ 5,913.77	$ 5,853.44	$ 5,957.43	$ 5,951.7	$ 5,887.8	$ 5,881.91	$ 6,030.04	$ 6,024.32	$ 5,898.51
Annual savings in GHG from electricity savings [kg CO2e/year]	460.2	459.7	455	463.1	462.7	457.7	457.3	468.8	468.3	458.5
Annual savings in natural gas [m3/year]	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49	$ 578.49
Annual savings in carbon tax for natural gas [$/year]	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39	$ 144.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88	$ 722.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6	3208.6
Net Present Value [$]	$ 89,658.39	$ 89,553.96	$ 88,159.42	$ 88,148.38	$ 88,044.13	$ 86,584.59	$ 86,477.41	$ 88,897.71	$ 88,793.63	$ 86,364.78
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	5.02	4.93	5.02	4.93	5.02	4.93	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,911.65
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 2,200.	$ 2,200.	$ 2,200.	$ 2,200.	$.	$.	$.

QUADPLEX Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 40,318.	$ 40,112.37	$ 41,239.2	$ 41,831.4	$ 41,033.57	$ 34,421.84	$ 41,625.77	$ 38,539.12	$ 42,078.	$ 34,421.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 60,557.64	$ 60,248.78	$ 61,941.28	$ 62,830.76	$ 61,632.42	$ 51,701.6	$ 62,521.91	$ 57,885.76	$ 63,201.16	$ 51,701.6
Net Present Value [$]	$ 108,859.62	$ 108,392.25	$ 108,339.38	$ 108,123.12	$ 107,863.42	$ 107,649.94	$ 107,646.98	$ 107,595.73	$ 107,579.46	$ 107,552.08
Incremental dollars per GHG saving	$ 63.38	$ 63.35	$ 64.66	$ 65.42	$ 64.63	$ 56.82	$ 65.4	$ 61.85	$ 65.93	$ 56.87
Auxiliary Energy Required Heating [GJ/yr]	106.8	108.5	105.6	104.4	107.3	123.9	106.1	114.6	105.6	124.2
Annual Energy DHW [GJ/yr]	62.4	62.4	62.4	62.4	62.4	62.4	62.4	62.4	62.4	62.4
Annual Energy Space Heating [GJ/yr]	63.8	64.7	63.2	62.6	64.1	73.7	63.6	68	63.1	73.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	236.6	237.6	236.1	235.5	237	246.6	236.5	240.9	236	246.7
Design Heating Load [W]	18825.6	19056.7	18737.6	18655.1	18968.8	21612.5	18886.3	19728.5	18641.1	21645.6
Annual Energy Electricity [kWh/yr]	48388.1	48649.5	48232.3	48086.3	48497.1	51148.2	48351.1	49570	48201.7	51186.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,783.6	$ 6,820.59	$ 6,761.56	$ 6,740.9	$ 6,799.02	$ 7,174.16	$ 6,778.37	$ 6,950.84	$ 6,757.23	$ 7,179.53
Annual Energy Natural Gas [m3/yr]	1676.5	1676.5	1676.5	1676.5	1676.5	1676.5	1676.5	1676.5	1676.5	1676.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18	$ 723.18
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	221845	221629	225733	229621	225517	58459	229405	170005	221863	58729
Upgrade Package List	Pkg3310211232	Pkg3310211132	Pkg3310311232	Pkg3310411232	Pkg3310311132	Pkg2210101032	Pkg3310411132	Pkg3210211232	Pkg3310211233	Pkg2210101132
GHGI [kg/m2]	8.16	8.17	8.16	8.15	8.16	8.23	8.16	8.19	8.16	8.23
% ICC	4.1%	4.1%	4.2%	4.3%	4.2%	3.5%	4.2%	3.9%	4.3%	3.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	64.7	65.8	64	63.3	65	75.1	64.3	69.4	64	75.2
Output: MEUI [kWh/(m2 * yr)]	80.6	81.2	80.3	79.9	80.8	86.6	80.5	83.2	80.2	86.7
Output: Better than ERS (%)	1770.0%	1740.0%	1790.0%	1810.0%	1760.0%	1420.0%	1770.0%	1620.0%	1790.0%	1420.0%
Output: Better than Envelope (%)	4760.0%	4680.0%	4820.0%	4880.0%	4740.0%	3920.0%	4800.0%	4380.0%	4820.0%	3910.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	S7948	S7686	S8104	S8250	S7839	S5188	S7985	S6766	S8134	S5150
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,170.63	$ 8,133.77	$ 8,192.59	$ 8,213.18	$ 8,155.26	$ 7,781.45	$ 8,175.84	$ 8,003.98	$ 8,196.91	$ 7,776.09
Annual savings in carbon tax for electricity [$/year]	$ 28.97	$ 28.84	$ 29.05	$ 29.12	$ 28.92	$ 27.59	$ 28.99	$ 28.38	$ 29.07	$ 27.57
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,199.6	$ 8,162.61	$ 8,221.65	$ 8,242.3	$ 8,184.18	$ 7,809.05	$ 8,204.84	$ 8,032.36	$ 8,225.98	$ 7,803.67
Annual savings in GHG from electricity savings [kg CO2e/year]	637.4	634.5	639.1	640.7	636.2	607.1	637.8	624.4	639.5	606.6
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .24	$ .24	$ .24	$ .24	$ .24	$ .24	$ .24	$ .24	$ .24	$ .24
Annual savings in carbon tax for natural gas [$/year]	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06	$ .06
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .3	$ .3	$ .3	$ .3	$ .3	$ .3	$ .3	$ .3	$ .3	$ .3
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Net Present Value [$]	$ 108,859.62	$ 108,392.25	$ 108,339.38	$ 108,123.12	$ 107,863.42	$ 107,649.94	$ 107,646.98	$ 107,595.73	$ 107,579.46	$ 107,552.08
ECM Details Envelope Components										
Attic Ceiling RSI	5.64	4.93	5.64	5.64	4.93	5.02	4.93	5.64	5.64	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.		$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR32	UsrSpecR32	UsrSpecR28
Flat Ceiling Cost of Upgrade	$ 205.63	$.	$ 205.63	$ 205.63	$.	$.	$.	$ 205.63	$ 205.63	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 10,191.5	$ 8,412.62	$ 10,191.5	$ 8,412.62	$ 10,191.5	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	NA	BC EffR20	BC EffR10	BC EffR10	NA
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 2,911.65	$ 3,832.85	$ 4,425.05	$ 3,832.85	$.	$ 4,425.05	$ 2,911.65	$ 2,911.65	$.
Exposed Floor Code	NA	NA	NA	NA	NA	NBC 936 5.02 [RSI]	NA	NA	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 5,440.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 25 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 23,044.3	$ 23,044.3	$ 23,244.3	$ 23,244.3	$ 23,512.62	$ 23,512.62	$ 23,913.52	$ 23,913.52	$ 24,021.84	$ 24,210.54
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 34,612.54	$ 34,612.54	$ 34,912.94	$ 34,912.94	$ 35,315.96	$ 35,315.96	$ 35,918.11	$ 35,918.11	$ 36,080.8	$ 36,364.23
Net Present Value [$]	$ 108,819.04	$ 108,685.94	$ 112,788.85	$ 112,655.74	$ 113,937.78	$ 113,805.04	$ 116,736.5	$ 116,609.05	$ 104,244.99	$ 115,297.04
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 40.06	$ 40.1	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 38.4	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	205.6	205.9	205.8	206	191.9	192.2	180.9	181.2	151.5	186.5
Annual Energy DHW [GJ/yr]	80.1	80.1	63.4	63.4	81.9	81.9	81.9	81.9	61.9	81.9
Annual Energy Space Heating [GJ/yr]	136.6	136.8	136.1	136.3	128.3	128.4	122.5	122.7	151.5	125.3
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	1.3	2.4
Total Energy [GJ/yr]	324.6	324.8	307.3	307.5	318	318.2	313.6	313.7	317.1	315.2
Design Heating Load [W]	27319.3	27354	26713.6	26748.3	25941.3	25976	25645.9	25680.6	21990.6	25645.9
Annual Energy Electricity [kWh/yr]	67919.7	67971.4	67756	67807.7	65590.1	65641.7	64347.3	64396.8	70908.7	64791
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,547.32	$ 9,554.64	$ 9,524.16	$ 9,531.47	$ 9,217.68	$ 9,224.99	$ 9,041.83	$ 9,048.83	$ 9,970.27	$ 9,104.61
Annual Energy Natural Gas [m3/yr]	2150.6	2150.6	1703.1	1703.1	2199.6	2199.6	2199.6	2199.6	1661.3	2199.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 927.69	$ 927.69	$ 734.66	$ 734.66	$ 948.83	$ 948.83	$ 948.83	$ 948.83	$ 716.63	$ 948.83
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	38891	39161	38893	39163	58330	58600	38998	39268	58451	38944
Upgrade Package List	Pkg2110101011	Pkg2110101111	Pkg2110101011	Pkg2110101111	Pkg2210101011	Pkg2210101111	Pkg2110101031	Pkg2110101131	Pkg2210101032	Pkg2110101021
GHGI [kg/m2]	10.61	10.61	8.74	8.74	10.76	10.76	10.73	10.73	8.64	10.74
% ICC	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	124.6	124.7	124.7	124.8	116.3	116.4	109.6	109.8	91.8	113
Output: MEUI [kWh/(m2 * yr)]	134.3	134.4	123.8	124	130.3	130.4	127.5	127.6	130	128.6
Output: Better than ERS (%)	90.0%	90.0%	620.0%	610.0%	290.0%	290.0%	430.0%	420.0%	320.0%	380.0%
Output: Better than Envelope (%)	1320.0%	1310.0%	1310.0%	1300.0%	1900.0%	1890.0%	2360.0%	2350.0%	3600.0%	2130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	52678	52626	52842	52790	55008	54956	56250	56201	49689	55807
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,427.6	$ 7,420.31	$ 7,450.68	$ 7,443.39	$ 7,756.07	$ 7,748.8	$ 7,931.31	$ 7,924.33	$ 7,006.15	$ 7,868.74
Annual savings in carbon tax for electricity [$/year]	$ 26.34	$ 26.31	$ 26.42	$ 26.4	$ 27.5	$ 27.48	$ 28.13	$ 28.1	$ 24.84	$ 27.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,453.94	$ 7,446.62	$ 7,477.1	$ 7,469.78	$ 7,783.58	$ 7,776.27	$ 7,959.43	$ 7,952.43	$ 7,030.99	$ 7,896.65
Annual savings in GHG from electricity savings [kg CO2e/year]	579.5	578.9	581.3	580.7	605.1	604.5	618.8	618.2	546.6	613.9
Annual savings in natural gas [m3/year]	16.7	16.7	0.02	0.02	18.52	18.52	18.52	18.52	1.54	18.52
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 154.69	$ 154.69	$ .21	$ .21	$ 171.6	$ 171.6	$ 171.6	$ 171.6	$ 14.22	$ 171.6
Annual savings in carbon tax for natural gas [$/year]	$ 38.61	$ 38.61	$ .05	$ .05	$ 42.83	$ 42.83	$ 42.83	$ 42.83	$ 3.55	$ 42.83
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 193.29	$ 193.29	$ .26	$ .26	$ 214.43	$ 214.43	$ 214.43	$ 214.43	$ 17.77	$ 214.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	858	858	1.1	1.1	951.8	951.8	951.8	951.8	78.9	951.8
Net Present Value [$]	$ 108,819.04	$ 108,685.94	$ 112,788.85	$ 112,655.74	$ 113,937.78	$ 113,805.04	$ 116,736.5	$ 116,609.05	$ 104,244.99	$ 115,297.04
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	5.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 25
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,366.24
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	5.28	5.28	3.87	3.87	5.28	3.87
Above Grade Wall Cost of Upgrade	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	NBC elec heat	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	NA	NA	DWHR eff 30	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 5,440.	$.
DHW System Cost of Upgrade	$.	$.	$ 2,400.	$ 2,400.	$.	$.	$.	$.	$ 2,400.	$.
Drain Water Heat Recovery Cost of Upgrade	$ 2,200.	$ 2,200.	$.	$.	$.	$.	$.	$.	$ 2,200.	$.

QUADPLEX Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 24,917.84	$ 24,917.84	$ 25,214.86	$ 25,214.86	$ 26,677.84	$ 26,677.84	$ 26,974.86	$ 26,974.86	$ 27,117.84	$ 27,117.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,426.6	$ 37,426.6	$ 37,872.72	$ 37,872.72	$ 40,070.12	$ 40,070.12	$ 40,516.24	$ 40,516.24	$ 40,731.	$ 40,731.
Net Present Value [$]	$ 79,875.29	$ 79,651.26	$ 75,454.04	$ 75,224.35	$ 79,175.38	$ 78,970.15	$ 74,773.66	$ 74,566.25	$ 78,592.78	$ 78,369.29
Incremental dollars per GHG saving	$ 6.83	$ 6.84	$ 6.95	$ 6.95	$ 7.31	$ 7.31	$ 7.42	$ 7.43	$ 7.43	$ 7.43
Auxiliary Energy Required Heating [GJ/yr]	170.9	171.2	176.7	177	169.4	169.7	175.2	175.5	170.4	170.7
Annual Energy DHW [GJ/yr]	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.1	32.1
Annual Energy Space Heating [GJ/yr]	170.9	171.2	176.6	177	169.4	169.7	175.1	175.4	170.4	170.7
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	307.6	307.9	313.3	313.6	306.1	306.4	311.8	312.1	306.3	306.6
Design Heating Load [W]	21990.6	22025.3	21990.6	22025.3	21797	21831.8	21797	21831.8	21990.6	22025.3
Annual Energy Electricity [kWh/yr]	85431.9	85518.9	87033.9	87123.1	85020.1	85099.8	86614.5	86695.1	85075.5	85162.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,025.3	$ 12,037.61	$ 12,251.98	$ 12,264.6	$ 11,967.03	$ 11,978.31	$ 12,192.64	$ 12,204.04	$ 11,974.87	$ 11,987.15
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58453	58723	58399	58669	58471	58741	58417	58687	58454	58724
Upgrade Package List	Pkg2210101032	Pkg2210101132	Pkg2210101022	Pkg2210101122	Pkg2210101033	Pkg2210101133	Pkg2210101023	Pkg2210101123	Pkg2210101032	Pkg2210101132
GHGI [kg/m2]	2.05	2.05	2.09	2.09	2.04	2.04	2.08	2.08	2.04	2.04
% ICC	2.5%	2.5%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	103.6	103.7	107.1	107.2	102.7	102.8	106.1	106.3	103.3	103.4
Output: MEUI [kWh/(m2 * yr)]	124.2	124.4	127.7	127.9	123.3	123.5	126.8	127	123.5	123.6
Output: Better than ERS (%)	610.0%	600.0%	440.0%	430.0%	660.0%	650.0%	480.0%	470.0%	650.0%	640.0%
Output: Better than Envelope (%)	2790.0%	2770.0%	2540.0%	2530.0%	2850.0%	2840.0%	2600.0%	2590.0%	2810.0%	2790.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	35166	35079	33564	33475	35578	35498	33983	33903	35522	35435
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,958.38	$ 4,946.11	$ 4,732.5	$ 4,719.92	$ 5,016.44	$ 5,005.2	$ 4,791.63	$ 4,780.27	$ 5,008.63	$ 4,996.39
Annual savings in carbon tax for electricity [$/year]	$ 17.58	$ 17.54	$ 16.78	$ 16.74	$ 17.79	$ 17.75	$ 16.99	$ 16.95	$ 17.76	$ 17.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,975.96	$ 4,963.65	$ 4,749.28	$ 4,736.66	$ 5,034.23	$ 5,022.95	$ 4,808.62	$ 4,797.22	$ 5,026.39	$ 5,014.11
Annual savings in GHG from electricity savings [kg CO2e/year]	386.8	385.9	369.2	368.2	391.4	390.5	373.8	372.9	390.7	389.8
Annual savings in natural gas [m3/year]	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71
Annual savings in carbon tax for natural gas [$/year]	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8
Net Present Value [$]	$ 79,875.29	$ 79,651.26	$ 75,454.04	$ 75,224.35	$ 79,175.38	$ 78,970.15	$ 74,773.66	$ 74,566.25	$ 78,592.78	$ 78,369.29
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 7,200.	$ 7,200.	$ 7,200.	$ 5,440.	$ 5,440.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,200.	$ 2,200.

QUADPLEX Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.25 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 28,981.84	$ 28,981.84	$ 29,278.86	$ 29,278.86	$ 26,581.84	$ 26,581.84	$ 29,353.52	$ 26,313.52	$ 29,353.52	$ 26,313.52
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 43,530.72	$ 43,530.72	$ 43,976.85	$ 43,976.85	$ 39,925.92	$ 39,925.92	$ 44,088.99	$ 39,522.91	$ 44,088.99	$ 39,522.91
Net Present Value [$]	$ 122,248.04	$ 122,120.78	$ 120,835.06	$ 120,703.96	$ 119,963.3	$ 119,836.22	$ 119,104.75	$ 119,017.95	$ 118,977.12	$ 118,888.86
Incremental dollars per GHG saving	$ 44.93	$ 44.97	$ 45.73	$ 45.76	$ 999,999.	$ 999,999.	$ 999,999.	$ 42.45	$ 999,999.	$ 42.49
Auxiliary Energy Required Heating [GJ/yr]	167.5	167.8	173	173.3	167.6	167.9	164.7	180.9	165	181.2
Annual Energy DHW [GJ/yr]	63.4	63.4	63.4	63.4	81.9	81.9	81.9	63.4	81.9	63.4
Annual Energy Space Heating [GJ/yr]	113.6	113.8	116.3	116.5	114.2	114.4	112.6	121.8	112.8	122
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	2.4	2.4	2.4	1.3	2.4	1.3	2.4
Total Energy [GJ/yr]	286.1	286.3	287.7	287.8	305.3	305.5	302.6	294.3	302.8	294.5
Design Heating Load [W]	23662.2	23696.9	23662.2	23696.9	24267.9	24302.6	24885.6	25040.2	24920.3	25074.9
Annual Energy Electricity [kWh/yr]	61853.1	61902.5	62286.6	62337.5	62057.4	62106.8	61314.3	64144.2	61363.9	64194.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,688.9	$ 8,695.89	$ 8,750.24	$ 8,757.44	$ 8,717.81	$ 8,724.8	$ 8,612.66	$ 9,013.09	$ 8,619.68	$ 9,020.19
Annual Energy Natural Gas [m3/yr]	1703.1	1703.1	1703.1	1703.1	2199.6	2199.6	2199.6	1703.1	2199.6	1703.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 734.66	$ 734.66	$ 734.66	$ 734.66	$ 948.83	$ 948.83	$ 948.83	$ 734.66	$ 948.83	$ 734.66
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58441	58711	58387	58657	58438	58708	39016	39001	39286	39271
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101021	Pkg2210101121	Pkg2210101031	Pkg2210101131	Pkg2110101032	Pkg2110101031	Pkg2110101132	Pkg2110101131
GHGI [kg/m2]	8.6	8.6	8.61	8.61	10.67	10.68	10.66	8.65	10.66	8.65
% ICC	3.0%	3.0%	3.0%	3.0%	2.7%	2.7%	3.0%	2.7%	3.0%	2.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	101.5	101.7	104.8	105	101.5	101.7	99.8	109.6	100	109.8
Output: MEUI [kWh/(m2 * yr)]	110.8	110.9	111.9	112	122.5	122.6	120.8	115.8	120.9	115.9
Output: Better than ERS (%)	1270.0%	1260.0%	1220.0%	1210.0%	680.0%	670.0%	760.0%	1020.0%	760.0%	1010.0%
Output: Better than Envelope (%)	2930.0%	2920.0%	2700.0%	2680.0%	2930.0%	2910.0%	3050.0%	2360.0%	3040.0%	2350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	58745	58695	58311	58260	58540	58491	59283	56454	59234	56403
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,282.99	$ 8,276.02	$ 8,221.87	$ 8,214.69	$ 8,254.18	$ 8,247.22	$ 8,358.96	$ 7,959.94	$ 8,351.97	$ 7,952.87
Annual savings in carbon tax for electricity [$/year]	$ 29.37	$ 29.35	$ 29.16	$ 29.13	$ 29.27	$ 29.25	$ 29.64	$ 28.23	$ 29.62	$ 28.2
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,312.36	$ 8,305.37	$ 8,251.02	$ 8,243.82	$ 8,283.45	$ 8,276.46	$ 8,388.6	$ 7,988.17	$ 8,381.58	$ 7,981.07
Annual savings in GHG from electricity savings [kg CO2e/year]	646.2	645.6	641.4	640.9	643.9	643.4	652.1	621	651.6	620.4
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	18.52	18.52	18.52	0.02	18.52	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ 171.6	$ 171.6	$ 171.6	$ .21	$ 171.6	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ 42.83	$ 42.83	$ 42.83	$ .05	$ 42.83	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ 214.43	$ 214.43	$ 214.43	$ .26	$ 214.43	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	951.8	951.8	951.8	1.1	951.8	1.1
Net Present Value [$]	$ 122,248.04	$ 122,120.78	$ 120,835.06	$ 120,703.96	$ 119,963.3	$ 119,836.22	$ 119,104.75	$ 119,017.95	$ 118,977.12	$ 118,888.86
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	5.02	4.93	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	UsrSpecR28	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.25	USI1.40 SHGC0.25	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,366.24	$ 3,366.24	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 5,744.3	$ 5,744.3
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	HRV sre 60	NA	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 5,440.	$.	$ 5,440.	$.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$.	$.	$.	$ 2,400.	$.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

QUADPLEX Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 32,077.84	$ 32,077.84	$ 34,277.84	$ 34,277.84	$ 34,421.84	$ 34,421.84	$ 34,849.52	$ 34,849.52	$ 34,989.49	$ 34,989.49
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 48,180.92	$ 48,180.92	$ 51,485.32	$ 51,485.32	$ 51,701.6	$ 51,701.6	$ 52,343.98	$ 52,343.98	$ 52,554.21	$ 52,554.21
Net Present Value [$]	$ 103,197.49	$ 103,067.31	$ 101,741.16	$ 101,609.7	$ 124,610.08	$ 124,485.19	$ 102,451.59	$ 102,318.49	$ 99,864.07	$ 99,734.98
Incremental dollars per GHG saving	$ 8.49	$ 8.5	$ 9.07	$ 9.07	$ 50.74	$ 50.78	$ 9.21	$ 9.21	$ 9.27	$ 9.27
Auxiliary Energy Required Heating [GJ/yr]	187.6	187.8	187	187.3	151.5	151.7	184.5	184.8	188.6	188.9
Annual Energy DHW [GJ/yr]	32.9	32.9	32.1	32.1	63.4	63.4	32.9	32.9	32.9	32.9
Annual Energy Space Heating [GJ/yr]	124.1	124.3	123.9	124	103.8	103.9	122.4	122.5	124.7	124.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	2.4	1.3	1.3	1.3	1.3	2.4	2.4
Total Energy [GJ/yr]	264.9	265.1	263.9	264.1	275.2	275.4	262.1	262.3	265.5	265.7
Design Heating Load [W]	23662.2	23696.9	23662.2	23696.9	22901.9	22936.6	24279.9	24314.6	23732.5	23767.2
Annual Energy Electricity [kWh/yr]	73591.6	73642.2	73302.7	73353.8	58822.5	58871	72804.7	72856.4	73755.4	73805.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,349.9	$ 10,357.06	$ 10,309.02	$ 10,316.25	$ 8,260.07	$ 8,266.93	$ 10,238.55	$ 10,245.87	$ 10,373.07	$ 10,380.18
Annual Energy Natural Gas [m3/yr]	0	0	0	0	1703.1	1703.1	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$ 734.66	$ 734.66	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58444	58714	58445	58715	58459	58729	39022	39292	60604	60874
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101031	Pkg2210101131	Pkg2210101032	Pkg2210101132	Pkg2110101032	Pkg2110101132	Pkg2210201031	Pkg2210201131
GHGI [kg/m2]	1.77	1.77	1.76	1.76	8.52	8.52	1.75	1.75	1.77	1.77
% ICC	3.3%	3.3%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	113.6	113.8	113.3	113.5	91.8	91.9	111.8	112	114.3	114.4
Output: MEUI [kWh/(m2 * yr)]	98.1	98.2	97.5	97.6	104.2	104.3	96.4	96.5	98.5	98.6
Output: Better than ERS (%)	1910.0%	1910.0%	1940.0%	1940.0%	1600.0%	1590.0%	2000.0%	1990.0%	1900.0%	1890.0%
Output: Better than Envelope (%)	2080.0%	2070.0%	2110.0%	2090.0%	3600.0%	3600.0%	2210.0%	2200.0%	2040.0%	2030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	47006	46956	47295	47244	61775	61727	47793	47741	46842	46792
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,627.86	$ 6,620.73	$ 6,668.59	$ 6,661.39	$ 8,710.3	$ 8,703.46	$ 6,738.81	$ 6,731.52	$ 6,604.76	$ 6,597.69
Annual savings in carbon tax for electricity [$/year]	$ 23.5	$ 23.48	$ 23.65	$ 23.62	$ 30.89	$ 30.86	$ 23.9	$ 23.87	$ 23.42	$ 23.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,651.36	$ 6,644.2	$ 6,692.24	$ 6,685.01	$ 8,741.19	$ 8,734.33	$ 6,762.71	$ 6,755.39	$ 6,628.19	$ 6,621.08
Annual savings in GHG from electricity savings [kg CO2e/year]	517.1	516.5	520.2	519.7	679.5	679	525.7	525.2	515.3	514.7
Annual savings in natural gas [m3/year]	63.43	63.43	63.43	63.43	0.02	0.02	63.43	63.43	63.43	63.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ .21	$ .21	$ 587.71	$ 587.71	$ 587.71	$ 587.71
Annual savings in carbon tax for natural gas [$/year]	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ .05	$ .05	$ 146.69	$ 146.69	$ 146.69	$ 146.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ .26	$ .26	$ 734.4	$ 734.4	$ 734.4	$ 734.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	3259.8	3259.8	3259.8	3259.8	1.1	1.1	3259.8	3259.8	3259.8	3259.8
Net Present Value [$]	$ 103,197.49	$ 103,067.31	$ 101,741.16	$ 101,609.7	$ 124,610.08	$ 124,485.19	$ 102,451.59	$ 102,318.49	$ 99,864.07	$ 99,734.98
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 2,911.65	$ 2,911.65
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 2,400.	$ 2,400.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$.	$.	$.

QUADPLEX Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 22 eff Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 30 eff Opt FlatCeilings=>UsrSpecR28 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 32,077.84	$ 32,077.84	$ 34,277.84	$ 34,277.84	$ 34,849.52	$ 34,849.52	$ 34,989.49	$ 34,989.49	$ 35,477.84	$ 35,477.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 48,180.92	$ 48,180.92	$ 51,485.32	$ 51,485.32	$ 52,343.98	$ 52,343.98	$ 52,554.21	$ 52,554.21	$ 53,287.72	$ 53,287.72
Net Present Value [$]	$ 103,197.49	$ 103,067.31	$ 101,741.16	$ 101,609.7	$ 102,451.59	$ 102,318.49	$ 99,864.07	$ 99,734.98	$ 101,037.42	$ 100,905.78
Incremental dollars per GHG saving	$ 8.49	$ 8.5	$ 9.07	$ 9.07	$ 9.21	$ 9.21	$ 9.27	$ 9.27	$ 9.38	$ 9.38
Auxiliary Energy Required Heating [GJ/yr]	187.6	187.8	187	187.3	184.5	184.8	188.6	188.9	186.7	187
Annual Energy DHW [GJ/yr]	32.9	32.9	32.1	32.1	32.9	32.9	32.9	32.9	31.5	31.5
Annual Energy Space Heating [GJ/yr]	124.1	124.3	123.9	124	122.4	122.5	124.7	124.9	123.7	123.9
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	2.4	2.4	2.4	2.4	1.3	1.3	2.4	2.4	2.4	2.4
Total Energy [GJ/yr]	264.9	265.1	263.9	264.1	262.1	262.3	265.5	265.7	263.2	263.4
Design Heating Load [W]	23662.2	23696.9	23662.2	23696.9	24279.9	24314.6	23732.5	23767.2	23662.2	23696.9
Annual Energy Electricity [kWh/yr]	73591.6	73642.2	73302.7	73353.8	72804.7	72856.4	73755.4	73805.6	73110	73161.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,349.9	$ 10,357.06	$ 10,309.02	$ 10,316.25	$ 10,238.55	$ 10,245.87	$ 10,373.07	$ 10,380.18	$ 10,281.75	$ 10,288.98
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	58444	58714	58445	58715	39022	39292	60604	60874	58446	58716
Upgrade Package List	Pkg2210101031	Pkg2210101131	Pkg2210101031	Pkg2210101131	Pkg2110101032	Pkg2110101132	Pkg2210201031	Pkg2210201131	Pkg2210101031	Pkg2210101131
GHGI [kg/m2]	1.77	1.77	1.76	1.76	1.75	1.75	1.77	1.77	1.75	1.76
% ICC	3.3%	3.3%	3.5%	3.5%	3.5%	3.5%	3.6%	3.6%	3.6%	3.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	113.6	113.8	113.3	113.5	111.8	112	114.3	114.4	113.1	113.3
Output: MEUI [kWh/(m2 * yr)]	98.1	98.2	97.5	97.6	96.4	96.5	98.5	98.6	97.1	97.2
Output: Better than ERS (%)	1910.0%	1910.0%	1940.0%	1940.0%	2000.0%	1990.0%	1900.0%	1890.0%	1970.0%	1960.0%
Output: Better than Envelope (%)	2080.0%	2070.0%	2110.0%	2090.0%	2210.0%	2200.0%	2040.0%	2030.0%	2120.0%	2110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	47006	46956	47295	47244	47793	47741	46842	46792	47488	47437
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,627.86	$ 6,620.73	$ 6,668.59	$ 6,661.39	$ 6,738.81	$ 6,731.52	$ 6,604.76	$ 6,597.69	$ 6,695.77	$ 6,688.56
Annual savings in carbon tax for electricity [$/year]	$ 23.5	$ 23.48	$ 23.65	$ 23.62	$ 23.9	$ 23.87	$ 23.42	$ 23.4	$ 23.74	$ 23.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,651.36	$ 6,644.2	$ 6,692.24	$ 6,685.01	$ 6,762.71	$ 6,755.39	$ 6,628.19	$ 6,621.08	$ 6,719.51	$ 6,712.28
Annual savings in GHG from electricity savings [kg CO2e/year]	517.1	516.5	520.2	519.7	525.7	525.2	515.3	514.7	522.4	521.8
Annual savings in natural gas [m3/year]	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71	$ 587.71
Annual savings in carbon tax for natural gas [$/year]	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69	$ 146.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4	$ 734.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8	3259.8
Net Present Value [$]	$ 103,197.49	$ 103,067.31	$ 101,741.16	$ 101,609.7	$ 102,451.59	$ 102,318.49	$ 99,864.07	$ 99,734.98	$ 101,037.42	$ 100,905.78
ECM Details Envelope Components										
Attic Ceiling RSI	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93	5.02	4.93
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28	NBC FlatCeiling [RSI]5.02	UsrSpecR28
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 5,744.3	$ 5,744.3	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	BC EffR10	BC EffR10	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 2,911.65	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]
Exposed Floor RSI	0	0	0	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 5,440.	$ 5,440.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.	$ 5,496.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 2,200.	$ 2,200.	$.	$.	$.	$.	$ 3,400.	$ 3,400.

QUADPLEX Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7
Summary Data							
Archetype	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k	quadplex.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt FlatCeilings=>UsrSpecR32 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt FlatCeilings=>UsrSpecR28 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt FlatCeilings=>UsrSpecR36 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 38,539.12	$ 39,460.32	$ 40,052.52	$ 38,333.49	$ 41,414.53	$ 39,254.69	$ 42,006.73
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 57,885.76	$ 59,269.4	$ 60,158.89	$ 57,576.9	$ 62,204.62	$ 58,960.54	$ 63,094.11
Net Present Value [$]	$ 126,570.32	$ 126,150.13	$ 126,047.63	$ 125,872.34	$ 125,529.53	$ 125,497.98	$ 125,420.99
Incremental dollars per GHG saving	$ 54.71	$ 55.85	$ 56.52	$ 54.72	$ 58.15	$ 55.85	$ 58.81
Auxiliary Energy Required Heating [GJ/yr]	139.3	137.9	136.6	141.3	134.9	139.9	133.6
Annual Energy DHW [GJ/yr]	63.4	63.4	63.4	63.4	63.4	63.4	63.4
Annual Energy Space Heating [GJ/yr]	95.3	94.5	93.8	96.5	92.7	95.7	92
Annual Energy Plug Loads [GJ/yr]	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Annual Energy Ventilation [GJ/yr]	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total Energy [GJ/yr]	266.7	266	265.3	268	264.1	267.2	263.4
Design Heating Load [W]	20813.8	20725	20641.5	21056.3	20342.8	20967.6	20259.3
Annual Energy Electricity [kWh/yr]	56461.8	56267.2	56077	56812.8	55749.2	56600.4	55561.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,926.03	$ 7,898.49	$ 7,871.58	$ 7,975.7	$ 7,825.2	$ 7,945.64	$ 7,798.61
Annual Energy Natural Gas [m3/yr]	1703.1	1703.1	1703.1	1703.1	1703.1	1703.1	1703.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 734.66	$ 734.66	$ 734.66	$ 734.66	$ 734.66	$ 734.66	$ 734.66
Step Code Level	4	4	4	4	4	4	4
HTAP Run Number	170005	173893	177781	169789	186205	173677	190957
Upgrade Package List	Pkg3210211232	Pkg3210311232	Pkg3210411232	Pkg3210211132	Pkg3220312333	Pkg3210311132	Pkg3220412333
GHGI [kg/m2]	8.47	8.46	8.46	8.48	8.45	8.47	8.45
% ICC	3.9%	4.0%	4.1%	3.9%	4.2%	4.0%	4.3%
Step Code Target Values							
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package							
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	84.4	83.6	82.8	85.6	81.8	84.8	81
Output: MEUI [kWh/(m2 * yr)]	99.1	98.6	98.2	99.8	97.5	99.4	97.1
Output: Better than ERS (%)	1860.0%	1880.0%	1900.0%	1820.0%	1940.0%	1840.0%	1960.0%
Output: Better than Envelope (%)	4120.0%	4180.0%	4230.0%	4040.0%	4310.0%	4090.0%	4360.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:							
Annual savings in electricity [kWh/yr]	64136	64330	64521	63785	64848	63997	65036
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,043.16	$ 9,070.6	$ 9,097.42	$ 8,993.67	$ 9,143.64	$ 9,023.62	$ 9,170.13
Annual savings in carbon tax for electricity [$/year]	$ 32.07	$ 32.17	$ 32.26	$ 31.89	$ 32.42	$ 32.	$ 32.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,075.23	$ 9,102.77	$ 9,129.68	$ 9,025.56	$ 9,176.06	$ 9,055.62	$ 9,202.65
Annual savings in GHG from electricity savings [kg CO2e/year]	705.5	707.6	709.7	701.6	713.3	704	715.4
Annual savings in natural gas [m3/year]	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21	$ .21
Annual savings in carbon tax for natural gas [$/year]	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05	$ .05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26	$ .26
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Net Present Value [$]	$ 126,570.32	$ 126,150.13	$ 126,047.63	$ 125,872.34	$ 125,529.53	$ 125,497.98	$ 125,420.99
ECM Details Envelope Components							
Attic Ceiling RSI	5.64	5.64	5.64	4.93	6.34	4.93	6.34
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Flat Ceiling Code	UsrSpecR32	UsrSpecR32	UsrSpecR32	UsrSpecR28	UsrSpecR36	UsrSpecR28	UsrSpecR36
Flat Ceiling Cost of Upgrade	$ 205.63	$ 205.63	$ 205.63	$.	$ 399.84	$.	$ 399.84
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22	$ 3,069.22
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62	$ 8,412.62
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR14	BC EffR20	BC EffR10	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 2,911.65	$ 3,832.85	$ 4,425.05	$ 2,911.65	$ 3,832.85	$ 3,832.85	$ 4,425.05
Exposed Floor Code	NA	NA	NA	NA	NA	NA	NA
Exposed Floor RSI	0	0	0	0	0	0	0
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components							
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.	$ 12,600.
Ventilation System Cost of Upgrade	$ 5,440.	$ 5,440.	$ 5,440.	$ 5,440.	$ 7,200.	$ 5,440.	$ 7,200.
DHW System Cost of Upgrade	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.	$ 2,400.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.

ROWHOUSE Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 12,868.64	$ 12,868.64	$ 13,142.64	$ 13,418.64	$ 13,418.64	$ 13,628.64	$ 13,628.64	$ 13,642.64	$ 13,642.64	$ 13,692.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 12,868.64	$ 12,868.64	$ 13,142.64	$ 13,418.64	$ 13,418.64	$ 13,628.64	$ 13,628.64	$ 13,642.64	$ 13,642.64	$ 13,692.64
Net Present Value [$]	$ 14,812.15	$ 14,812.15	$ 5,196.31	$ 14,503.16	$ 14,503.16	$ 16,451.06	$ 16,451.06	$ 3,675.25	$ 3,675.25	$ 5,266.15
Incremental dollars per GHG saving	$ 2.99	$ 2.99	$ 2.	$ 3.08	$ 3.08	$ 3.37	$ 3.37	$ 1.94	$ 1.94	$ 2.07
Auxiliary Energy Required Heating [GJ/yr]	85.8	85.8	118.6	85.8	85.8	70.2	70.2	110.4	110.4	118.3
Annual Energy DHW [GJ/yr]	81	81	41.7	79.9	79.9	102.5	102.5	41.7	41.7	41.2
Annual Energy Space Heating [GJ/yr]	90.9	90.9	125.6	90.9	90.9	74.4	74.4	117	117	125.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	1.5	1.5	6.2	6.2	6.2
Total Energy [GJ/yr]	331.8	331.8	327.3	330.8	330.8	332.1	332.1	318.7	318.7	326.4
Design Heating Load [W]	19584.3	19584.3	20954.7	19584.3	19584.3	19318.5	19318.5	19663	19663.1	20954.7
Annual Energy Electricity [kWh/yr]	44894.3	44894.3	56651.2	44894.4	44894.4	43497.9	43497.9	56608	56608	56497.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,289.23	$ 6,289.23	$ 7,952.83	$ 6,289.24	$ 6,289.24	$ 6,091.64	$ 6,091.64	$ 7,946.72	$ 7,946.72	$ 7,931.05
Annual Energy Natural Gas [m3/yr]	4570.6	4570.6	3313.1	4541.8	4541.8	4713.4	4713.4	3085.1	3085.1	3303.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,971.6	$ 1,971.6	$ 1,429.16	$ 1,959.17	$ 1,959.17	$ 2,033.2	$ 2,033.2	$ 1,330.8	$ 1,330.8	$ 1,424.84
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	58	598	7	59	599	73	613	61	601	8
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg1100101011	Pkg2100101011	Pkg2100111011	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011	Pkg1100101011
GHGI [kg/m2]	9.1	9.1	6.86	9.05	9.05	9.36	9.36	6.43	6.43	6.84
% ICC	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	23.5	23.5	32.4	23.5	23.5	19.2	19.2	30.2	30.2	32.4
Output: MEUI [kWh/(m2 * yr)]	48.7	48.7	47.5	48.4	48.4	48.8	48.8	45.1	45.1	47.2
Output: Better than ERS (%)	7060.0%	7060.0%	6850.0%	7010.0%	7010.0%	6750.0%	6750.0%	6400.0%	6400.0%	6800.0%
Output: Better than Envelope (%)	4070.0%	4070.0%	1800.0%	4070.0%	4070.0%	5150.0%	5150.0%	2370.0%	2370.0%	1820.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3500	3500	8256	3500	3500	4897	4897	8213	8213	8102
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 493.57	$ 493.57	$ 1,164.15	$ 493.56	$ 493.56	$ 690.46	$ 690.46	$ 1,158.06	$ 1,158.06	$ 1,142.45
Annual savings in carbon tax for electricity [$/year]	$ 1.75	$ 1.75	$ 4.13	$ 1.75	$ 1.75	$ 2.45	$ 2.45	$ 4.11	$ 4.11	$ 4.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 495.32	$ 495.32	$ 1,168.28	$ 495.31	$ 495.31	$ 692.91	$ 692.91	$ 1,162.17	$ 1,162.17	$ 1,146.5
Annual savings in GHG from electricity savings [kg CO2e/year]	38.5	38.5	90.8	38.5	38.5	53.9	53.9	90.3	90.3	89.1
Annual savings in natural gas [m3/year]	83.04	83.04	129.9	84.12	84.12	77.72	77.72	138.39	138.39	130.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 769.39	$ 769.39	$ 1,203.48	$ 779.33	$ 779.33	$ 720.1	$ 720.1	$ 1,282.19	$ 1,282.19	$ 1,206.94
Annual savings in carbon tax for natural gas [$/year]	$ 192.04	$ 192.04	$ 300.38	$ 194.52	$ 194.52	$ 179.73	$ 179.73	$ 320.03	$ 320.03	$ 301.25
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 961.43	$ 961.43	$ 1,503.87	$ 973.85	$ 973.85	$ 899.83	$ 899.83	$ 1,602.22	$ 1,602.22	$ 1,508.18
Annual savings in GHG from natural gas savings [kg CO2e/year]	4267.5	4267.5	6675.2	4322.6	4322.6	3994.1	3994.1	7111.7	7111.7	6694.3
Net Present Value [$]	$ 14,812.15	$ 14,812.15	$ 5,196.31	$ 14,503.16	$ 14,503.16	$ 16,451.06	$ 16,451.06	$ 3,675.25	$ 3,675.25	$ 5,266.15
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60	NA	NA	NA
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$ 1,360.	$ 1,360.	$.	$.	$.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$.	$.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$.	$ 550.

ROWHOUSE Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 16,292.64	$ 16,842.64	$ 17,142.64	$ 17,652.64	$ 18,092.64	$ 18,202.64	$ 18,502.64	$ 18,642.64	$ 18,942.64	$ 15,518.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,292.64	$ 16,842.64	$ 17,142.64	$ 17,652.64	$ 18,092.64	$ 18,202.64	$ 18,502.64	$ 18,642.64	$ 18,942.64	$ 15,518.64
Net Present Value [$]	$ 10,725.25	$ 10,732.24	$ 10,729.88	$ 4,761.22	$ 5,022.28	$ 4,848.55	$ 4,846.55	$ 5,103.22	$ 5,101.23	$ 7,653.93
Incremental dollars per GHG saving	$ 1.27	$ 1.32	$ 1.34	$ 1.38	$ 1.41	$ 1.42	$ 1.44	$ 1.45	$ 1.48	$ 1.77
Auxiliary Energy Required Heating [GJ/yr]	118.6	118.3	118	104.5	103.8	104.1	103.9	103.5	103.3	93.5
Annual Energy DHW [GJ/yr]	41.7	41.2	40.8	41.7	41.7	41.2	40.8	41.2	40.8	81
Annual Energy Space Heating [GJ/yr]	42.6	42.4	42.3	37.2	36.9	37.1	37	36.8	36.7	33.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	1.5	1.5	1.5	1.5	1.5	1.5	6.2
Total Energy [GJ/yr]	246.1	245.3	244.9	235.8	235.6	235.2	234.8	234.9	234.5	277
Design Heating Load [W]	21741.7	21741.7	21741.7	21397.2	21309.5	21397.2	21397.2	21309.5	21309.5	21617.7
Annual Energy Electricity [kWh/yr]	68354.8	68143.9	68026.4	65509.9	65440.4	65330.2	65212.9	65258.2	65140.9	54442
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,608.89	$ 9,579.05	$ 9,562.42	$ 9,206.34	$ 9,196.5	$ 9,180.91	$ 9,164.31	$ 9,170.72	$ 9,154.12	$ 7,640.23
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	2174.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 937.92
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	16	17	18	34	52	35	36	53	54	13
Upgrade Package List	Pkg1100101011	Pkg1100101011	Pkg1100101011	Pkg1100101012	Pkg1100101013	Pkg1100101012	Pkg1100101012	Pkg1100101013	Pkg1100101013	Pkg1100101011
GHGI [kg/m2]	0.74	0.74	0.74	0.71	0.71	0.71	0.71	0.71	0.71	4.69
% ICC	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	32.4	32.4	32.3	28.6	28.4	28.5	28.4	28.3	28.2	25.6
Output: MEUI [kWh/(m2 * yr)]	25.2	25	24.9	22.4	22.3	22.2	22.1	22.2	22	33.6
Output: Better than ERS (%)	2950.0%	2900.0%	2880.0%	2400.0%	2390.0%	2370.0%	2350.0%	2360.0%	2340.0%	4560.0%
Output: Better than Envelope (%)	1800.0%	1820.0%	1840.0%	2770.0%	2820.0%	2800.0%	2810.0%	2840.0%	2860.0%	3530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19960	19749	19632	17115	17046	16935	16818	16863	16746	6047
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,814.36	$ 2,784.62	$ 2,768.06	$ 2,413.23	$ 2,403.43	$ 2,387.89	$ 2,371.35	$ 2,377.74	$ 2,361.2	$ 852.66
Annual savings in carbon tax for electricity [$/year]	$ 9.98	$ 9.87	$ 9.82	$ 8.56	$ 8.52	$ 8.47	$ 8.41	$ 8.43	$ 8.37	$ 3.02
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,824.34	$ 2,794.5	$ 2,777.87	$ 2,421.79	$ 2,411.95	$ 2,396.36	$ 2,379.76	$ 2,386.17	$ 2,369.57	$ 855.68
Annual savings in GHG from electricity savings [kg CO2e/year]	219.6	217.2	215.9	188.3	187.5	186.3	185	185.5	184.2	66.5
Annual savings in natural gas [m3/year]	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	172.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 1,596.6
Annual savings in carbon tax for natural gas [$/year]	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 398.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 1,995.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	8855.7
Net Present Value [$]	$ 10,725.25	$ 10,732.24	$ 10,729.88	$ 4,761.22	$ 5,022.28	$ 4,848.55	$ 4,846.55	$ 5,103.22	$ 5,101.23	$ 7,653.93
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 850.	$ 550.	$ 850.	$.

ROWHOUSE Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 14,228.64	$ 14,228.64	$ 14,668.64	$ 14,668.64	$ 14,778.64	$ 14,778.64	$ 15,078.64	$ 15,078.64	$ 15,218.64	$ 15,218.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 14,228.64	$ 14,228.64	$ 14,668.64	$ 14,668.64	$ 14,778.64	$ 14,778.64	$ 15,078.64	$ 15,078.64	$ 15,218.64	$ 15,218.64
Net Present Value [$]	$ 20,096.35	$ 20,096.35	$ 19,800.81	$ 19,800.81	$ 19,788.15	$ 19,788.15	$ 19,642.95	$ 19,642.95	$ 19,491.82	$ 19,491.82
Incremental dollars per GHG saving	$ 2.83	$ 2.83	$ 2.9	$ 2.9	$ 2.91	$ 2.91	$ 2.95	$ 2.95	$ 2.98	$ 2.98
Auxiliary Energy Required Heating [GJ/yr]	72.6	72.6	72	72	72.6	72.6	72.6	72.6	72	72
Annual Energy DHW [GJ/yr]	81	81	81	81	79.9	79.9	79.2	79.2	79.9	79.9
Annual Energy Space Heating [GJ/yr]	76.9	76.9	76.3	76.3	76.9	76.9	76.9	76.9	76.3	76.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	313.1	313.1	312.5	312.5	312.1	312.1	311.4	311.4	311.5	311.5
Design Heating Load [W]	19239.8	19239.8	19152.1	19152.1	19239.8	19239.8	19239.8	19239.8	19152.1	19152.1
Annual Energy Electricity [kWh/yr]	43510.5	43510.5	43507.4	43507.4	43510.6	43510.6	43510.6	43510.6	43507.5	43507.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,093.42	$ 6,093.42	$ 6,092.98	$ 6,092.98	$ 6,093.43	$ 6,093.43	$ 6,093.43	$ 6,093.43	$ 6,093.	$ 6,093.
Annual Energy Natural Gas [m3/yr]	4202.7	4202.7	4186.4	4186.4	4173.8	4173.8	4155.3	4155.3	4157.6	4157.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,812.9	$ 1,812.9	$ 1,805.87	$ 1,805.87	$ 1,800.43	$ 1,800.43	$ 1,792.45	$ 1,792.45	$ 1,793.44	$ 1,793.44
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	76	616	94	634	77	617	78	618	95	635
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013
GHGI [kg/m2]	8.4	8.4	8.37	8.37	8.34	8.34	8.31	8.31	8.31	8.31
% ICC	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	19.9	19.9	19.7	19.7	19.9	19.9	19.9	19.9	19.7	19.7
Output: MEUI [kWh/(m2 * yr)]	43.6	43.6	43.4	43.4	43.3	43.3	43.1	43.1	43.1	43.1
Output: Better than ERS (%)	6100.0%	6100.0%	6070.0%	6070.0%	6050.0%	6050.0%	6010.0%	6010.0%	6020.0%	6020.0%
Output: Better than Envelope (%)	4980.0%	4980.0%	5020.0%	5020.0%	4980.0%	4980.0%	4980.0%	4980.0%	5020.0%	5020.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4884	4884	4887	4887	4884	4884	4884	4884	4887	4887
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 688.69	$ 688.69	$ 689.12	$ 689.12	$ 688.67	$ 688.67	$ 688.67	$ 688.67	$ 689.11	$ 689.11
Annual savings in carbon tax for electricity [$/year]	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44	$ 2.44
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 691.13	$ 691.13	$ 691.57	$ 691.57	$ 691.11	$ 691.11	$ 691.11	$ 691.11	$ 691.55	$ 691.55
Annual savings in GHG from electricity savings [kg CO2e/year]	53.7	53.7	53.8	53.8	53.7	53.7	53.7	53.7	53.8	53.8
Annual savings in natural gas [m3/year]	96.75	96.75	97.36	97.36	97.83	97.83	98.52	98.52	98.43	98.43
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 896.39	$ 896.39	$ 902.02	$ 902.02	$ 906.37	$ 906.37	$ 912.75	$ 912.75	$ 911.96	$ 911.96
Annual savings in carbon tax for natural gas [$/year]	$ 223.73	$ 223.73	$ 225.14	$ 225.14	$ 226.22	$ 226.22	$ 227.82	$ 227.82	$ 227.62	$ 227.62
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,120.13	$ 1,120.13	$ 1,127.16	$ 1,127.16	$ 1,132.59	$ 1,132.59	$ 1,140.57	$ 1,140.57	$ 1,139.58	$ 1,139.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	4971.9	4971.9	5003.1	5003.1	5027.2	5027.2	5062.6	5062.6	5058.2	5058.2
Net Present Value [$]	$ 20,096.35	$ 20,096.35	$ 19,800.81	$ 19,800.81	$ 19,788.15	$ 19,788.15	$ 19,642.95	$ 19,642.95	$ 19,491.82	$ 19,491.82
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 15,002.64	$ 15,002.64	$ 15,418.64	$ 15,418.64	$ 15,442.64	$ 15,442.64	$ 15,552.64	$ 15,552.64	$ 15,852.64	$ 15,852.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 15,002.64	$ 15,002.64	$ 15,418.64	$ 15,418.64	$ 15,442.64	$ 15,442.64	$ 15,552.64	$ 15,552.64	$ 15,852.64	$ 15,852.64
Net Present Value [$]	$ 1,828.71	$ 1,828.71	$ 5,494.15	$ 5,494.15	$ 1,547.43	$ 1,547.43	$ 1,755.11	$ 1,754.93	$ 1,761.19	$ 1,761.19
Incremental dollars per GHG saving	$ 1.93	$ 1.93	$ 2.	$ 2.	$ 1.97	$ 1.97	$ 1.99	$ 1.99	$ 2.03	$ 2.03
Auxiliary Energy Required Heating [GJ/yr]	96.4	96.4	83.2	83.2	95.8	95.8	96	96	95.8	95.8
Annual Energy DHW [GJ/yr]	41.7	41.7	102.5	102.5	41.7	41.7	41.2	41.2	40.8	40.8
Annual Energy Space Heating [GJ/yr]	102.1	102.1	30	30	101.4	101.4	101.7	101.7	101.5	101.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	6.2	6.2	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	299.1	299.1	294.9	294.9	298.4	298.4	298.1	298.1	297.6	297.6
Design Heating Load [W]	19318.5	19318.5	20122.3	20122.3	19230.8	19230.8	19318.5	19318.5	19318.5	19318.5
Annual Energy Electricity [kWh/yr]	55219.5	55219.5	53441.2	53441.2	55216.1	55216.1	55065.7	55065.8	54967	54967
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,750.24	$ 7,750.24	$ 7,498.61	$ 7,498.61	$ 7,749.76	$ 7,749.76	$ 7,728.48	$ 7,728.5	$ 7,714.52	$ 7,714.52
Annual Energy Natural Gas [m3/yr]	2692.4	2692.4	2751.7	2751.7	2674.5	2674.5	2682.8	2682.8	2676.6	2676.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,161.41	$ 1,161.41	$ 1,186.99	$ 1,186.99	$ 1,153.69	$ 1,153.69	$ 1,157.27	$ 1,157.27	$ 1,154.59	$ 1,154.59
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	79	619	64	604	97	637	80	620	81	621
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	5.68	5.68	5.77	5.77	5.64	5.64	5.66	5.66	5.64	5.64
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.4	26.4	22.8	22.8	26.2	26.2	26.3	26.3	26.2	26.2
Output: MEUI [kWh/(m2 * yr)]	39.8	39.8	38.5	38.5	39.6	39.6	39.5	39.5	39.3	39.3
Output: Better than ERS (%)	5390.0%	5390.0%	5150.0%	5150.0%	5360.0%	5360.0%	5340.0%	5340.0%	5320.0%	5320.0%
Output: Better than Envelope (%)	3330.0%	3330.0%	4250.0%	4250.0%	3370.0%	3370.0%	3360.0%	3360.0%	3370.0%	3370.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6825	6825	5046	5046	6821	6821	6671	6671	6572	6572
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 962.28	$ 962.28	$ 711.54	$ 711.54	$ 961.8	$ 961.8	$ 940.6	$ 940.61	$ 926.68	$ 926.68
Annual savings in carbon tax for electricity [$/year]	$ 3.41	$ 3.41	$ 2.52	$ 2.52	$ 3.41	$ 3.41	$ 3.34	$ 3.34	$ 3.29	$ 3.29
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 965.7	$ 965.7	$ 714.07	$ 714.07	$ 965.21	$ 965.21	$ 943.93	$ 943.95	$ 929.97	$ 929.97
Annual savings in GHG from electricity savings [kg CO2e/year]	75.1	75.1	55.5	55.5	75	75	73.4	73.4	72.3	72.3
Annual savings in natural gas [m3/year]	153.02	153.02	150.81	150.81	153.69	153.69	153.38	153.38	153.61	153.61
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,417.75	$ 1,417.75	$ 1,397.28	$ 1,397.28	$ 1,423.93	$ 1,423.93	$ 1,421.07	$ 1,421.07	$ 1,423.21	$ 1,423.21
Annual savings in carbon tax for natural gas [$/year]	$ 353.86	$ 353.86	$ 348.75	$ 348.75	$ 355.41	$ 355.41	$ 354.69	$ 354.69	$ 355.23	$ 355.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,771.62	$ 1,771.62	$ 1,746.04	$ 1,746.04	$ 1,779.34	$ 1,779.34	$ 1,775.76	$ 1,775.76	$ 1,778.43	$ 1,778.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	7863.7	7863.7	7750.1	7750.1	7897.9	7897.9	7882	7882	7893.9	7893.9
Net Present Value [$]	$ 1,828.71	$ 1,828.71	$ 5,494.15	$ 5,494.15	$ 1,547.43	$ 1,547.43	$ 1,755.11	$ 1,754.93	$ 1,761.19	$ 1,761.19
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	BC ASHP	BC ASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$ 3,150.	$ 3,150.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$.	$.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.

ROWHOUSE Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 16,792.64	$ 16,792.64	$ 17,342.64	$ 17,342.64	$ 17,642.64	$ 17,642.64	$ 17,912.98	$ 17,912.98	$ 18,152.64	$ 18,152.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,792.64	$ 16,792.64	$ 17,342.64	$ 17,342.64	$ 17,642.64	$ 17,642.64	$ 17,912.98	$ 17,912.98	$ 18,152.64	$ 18,152.64
Net Present Value [$]	$ 9,034.96	$ 9,034.96	$ 9,114.8	$ 9,114.8	$ 9,122.85	$ 9,122.85	$ 9,766.94	$ 9,766.94	$ 3,172.26	$ 3,172.26
Incremental dollars per GHG saving	$ 1.31	$ 1.31	$ 1.35	$ 1.35	$ 1.38	$ 1.38	$ 1.4	$ 1.4	$ 1.41	$ 1.41
Auxiliary Energy Required Heating [GJ/yr]	110.4	110.4	110.1	110.1	109.9	109.9	108.5	108.5	96.4	96.4
Annual Energy DHW [GJ/yr]	41.7	41.7	41.2	41.2	40.8	40.8	41.7	41.7	41.7	41.7
Annual Energy Space Heating [GJ/yr]	39.6	39.6	39.4	39.4	39.4	39.4	39	39	34.3	34.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	1.5	1.5
Total Energy [GJ/yr]	243	243	242.4	242.4	241.9	241.9	242.5	242.5	232.9	232.9
Design Heating Load [W]	20122.3	20122.3	20122.3	20122.3	20122.3	20122.3	19872	19872	19777.8	19777.8
Annual Energy Electricity [kWh/yr]	67504	67504	67321.4	67321.4	67208	67208	67353.2	67353.2	64698.5	64698.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,488.5	$ 9,488.5	$ 9,462.66	$ 9,462.66	$ 9,446.62	$ 9,446.62	$ 9,467.16	$ 9,467.16	$ 9,091.52	$ 9,091.52
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	70	610	71	611	72	612	340	880	88	628
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100102011	Pkg2100112011	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.7	0.7
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	30.2	30.2	30.1	30.1	30.1	30.1	29.7	29.7	26.4	26.4
Output: MEUI [kWh/(m2 * yr)]	24.4	24.4	24.2	24.2	24.1	24.1	24.2	24.2	21.6	21.6
Output: Better than ERS (%)	2780.0%	2780.0%	2750.0%	2750.0%	2720.0%	2720.0%	2760.0%	2760.0%	2250.0%	2250.0%
Output: Better than Envelope (%)	2370.0%	2370.0%	2390.0%	2390.0%	2400.0%	2400.0%	2500.0%	2500.0%	3330.0%	3330.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19109	19109	18927	18927	18813	18813	18958	18958	16304	16304
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,694.4	$ 2,694.4	$ 2,668.65	$ 2,668.65	$ 2,652.66	$ 2,652.66	$ 2,673.13	$ 2,673.13	$ 2,298.82	$ 2,298.82
Annual savings in carbon tax for electricity [$/year]	$ 9.55	$ 9.55	$ 9.46	$ 9.46	$ 9.41	$ 9.41	$ 9.48	$ 9.48	$ 8.15	$ 8.15
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,703.95	$ 2,703.95	$ 2,678.11	$ 2,678.11	$ 2,662.07	$ 2,662.07	$ 2,682.61	$ 2,682.61	$ 2,306.97	$ 2,306.97
Annual savings in GHG from electricity savings [kg CO2e/year]	210.2	210.2	208.2	208.2	206.9	206.9	208.5	208.5	179.3	179.3
Annual savings in natural gas [m3/year]	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18
Annual savings in carbon tax for natural gas [$/year]	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8
Net Present Value [$]	$ 9,034.96	$ 9,034.96	$ 9,114.8	$ 9,114.8	$ 9,122.85	$ 9,122.85	$ 9,766.94	$ 9,766.94	$ 3,172.26	$ 3,172.26
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$.	$.

ROWHOUSE Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,170.15	$ 21,170.15	$ 21,720.15	$ 21,720.15	$ 21,610.15	$ 21,610.15	$ 22,020.15	$ 22,020.15	$ 22,160.15	$ 22,160.15
ICC with multiplier (Van=1.0,this Cz =1)	$ 21,170.15	$ 21,170.15	$ 21,720.15	$ 21,720.15	$ 21,610.15	$ 21,610.15	$ 22,020.15	$ 22,020.15	$ 22,160.15	$ 22,160.15
Net Present Value [$]	$ 19,863.58	$ 19,863.58	$ 19,555.5	$ 19,554.77	$ 19,547.71	$ 19,547.71	$ 19,410.18	$ 19,410.18	$ 19,239.51	$ 19,239.51
Incremental dollars per GHG saving	$ 3.27	$ 3.27	$ 3.33	$ 3.33	$ 3.32	$ 3.32	$ 3.35	$ 3.35	$ 3.38	$ 3.38
Auxiliary Energy Required Heating [GJ/yr]	45.5	45.5	45.5	45.5	45	45	45.5	45.5	45	45
Annual Energy DHW [GJ/yr]	81	81	79.9	79.9	81	81	79.2	79.2	79.9	79.9
Annual Energy Space Heating [GJ/yr]	48.2	48.2	48.2	48.2	47.7	47.7	48.2	48.2	47.7	47.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	284.4	284.4	283.4	283.4	283.9	283.9	282.7	282.7	282.8	282.8
Design Heating Load [W]	17235.9	17235.9	17235.9	17235.9	17148.2	17148.2	17235.9	17235.9	17148.2	17148.2
Annual Energy Electricity [kWh/yr]	43367.3	43367.3	43367.3	43367.3	43364.6	43364.6	43367.4	43367.4	43364.7	43364.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,073.16	$ 6,073.16	$ 6,073.16	$ 6,073.16	$ 6,072.78	$ 6,072.78	$ 6,073.17	$ 6,073.17	$ 6,072.79	$ 6,072.79
Annual Energy Natural Gas [m3/yr]	3445.8	3445.8	3416.9	3417	3431.8	3431.8	3398.4	3398.4	3402.9	3402.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,486.4	$ 1,486.4	$ 1,473.93	$ 1,473.97	$ 1,480.36	$ 1,480.36	$ 1,465.95	$ 1,465.95	$ 1,467.89	$ 1,467.89
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	184	724	185	725	202	742	186	726	203	743
Upgrade Package List	Pkg2100101032	Pkg2100111032	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033
GHGI [kg/m2]	6.97	6.97	6.91	6.91	6.94	6.94	6.88	6.88	6.89	6.89
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	12.5	12.5	12.5	12.5	12.3	12.3	12.5	12.5	12.3	12.3
Output: MEUI [kWh/(m2 * yr)]	35.8	35.8	35.5	35.6	35.6	35.6	35.3	35.3	35.3	35.3
Output: Better than ERS (%)	4620.0%	4620.0%	4570.0%	4570.0%	4600.0%	4600.0%	4530.0%	4530.0%	4540.0%	4540.0%
Output: Better than Envelope (%)	6850.0%	6850.0%	6850.0%	6850.0%	6890.0%	6890.0%	6850.0%	6850.0%	6890.0%	6890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5028	5028	5028	5028	5030	5030	5027	5027	5030	5030
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 708.88	$ 708.88	$ 708.88	$ 708.88	$ 709.26	$ 709.26	$ 708.86	$ 708.86	$ 709.24	$ 709.24
Annual savings in carbon tax for electricity [$/year]	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.52	$ 2.52	$ 2.51	$ 2.51	$ 2.52	$ 2.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 711.39	$ 711.39	$ 711.39	$ 711.39	$ 711.77	$ 711.77	$ 711.38	$ 711.38	$ 711.76	$ 711.76
Annual savings in GHG from electricity savings [kg CO2e/year]	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3
Annual savings in natural gas [m3/year]	124.95	124.95	126.03	126.02	125.47	125.47	126.72	126.72	126.55	126.55
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,157.68	$ 1,157.68	$ 1,167.65	$ 1,167.62	$ 1,162.51	$ 1,162.51	$ 1,174.04	$ 1,174.04	$ 1,172.49	$ 1,172.49
Annual savings in carbon tax for natural gas [$/year]	$ 288.95	$ 288.95	$ 291.44	$ 291.43	$ 290.16	$ 290.16	$ 293.03	$ 293.03	$ 292.65	$ 292.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,446.63	$ 1,446.63	$ 1,459.09	$ 1,459.05	$ 1,452.67	$ 1,452.67	$ 1,467.07	$ 1,467.07	$ 1,465.13	$ 1,465.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	6421.1	6421.1	6476.5	6476.3	6447.9	6447.9	6511.9	6511.9	6503.3	6503.3
Net Present Value [$]	$ 19,863.58	$ 19,863.58	$ 19,555.5	$ 19,554.77	$ 19,547.71	$ 19,547.71	$ 19,410.18	$ 19,410.18	$ 19,239.51	$ 19,239.51
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Vancouver: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 33,310.11	$ 33,605.58	$ 33,750.11	$ 33,860.11	$ 33,884.64	$ 34,045.58	$ 34,084.11	$ 34,155.58	$ 34,160.11	$ 34,250.11
ICC with multiplier (Van=1.0,this Cz =1)	$ 33,310.11	$ 33,605.58	$ 33,750.11	$ 33,860.11	$ 33,884.64	$ 34,045.58	$ 34,084.11	$ 34,155.58	$ 34,160.11	$ 34,250.11
Net Present Value [$]	$ 6,582.86	$ 6,592.13	$ 6,271.04	$ 6,275.26	$ 6,425.17	$ 6,228.63	$ 9,977.59	$ 6,284.7	$ 6,130.55	$ 5,888.62
Incremental dollars per GHG saving	$ 3.76	$ 3.79	$ 3.81	$ 3.8	$ 3.82	$ 3.84	$ 2.65	$ 3.83	$ 3.82	$ 3.87
Auxiliary Energy Required Heating [GJ/yr]	38.2	37.1	37.7	38.2	36.6	36.7	57.1	37.2	38.2	37.4
Annual Energy DHW [GJ/yr]	81	81	81	79.9	81	81	41.7	79.9	79.2	81
Annual Energy Space Heating [GJ/yr]	13.9	13.4	13.7	13.9	13.3	13.3	20.4	13.4	13.9	13.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	253.6	253.2	253.4	252.5	253	253	220.2	252.1	251.8	253.2
Design Heating Load [W]	16176.3	15986.3	16088.6	16176.3	15884.2	15898.6	16263.4	15986.3	16176.3	16069.8
Annual Energy Electricity [kWh/yr]	47947.3	47828.9	47897.5	47948.1	47785.4	47799.2	61153.6	47829.7	47948.7	47851.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,721.23	$ 6,704.47	$ 6,714.18	$ 6,721.34	$ 6,698.32	$ 6,700.27	$ 8,589.92	$ 6,704.59	$ 6,721.43	$ 6,707.71
Annual Energy Natural Gas [m3/yr]	2174.3	2174.3	2174.3	2145.1	2174.3	2174.3	0	2145.1	2126.4	2174.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 937.92	$ 937.92	$ 937.92	$ 925.32	$ 937.92	$ 937.92	$.	$ 925.32	$ 917.25	$ 937.92
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	17779	18427	17797	17780	19075	18445	17782	18428	17781	17815
Upgrade Package List	Pkg3200211032	Pkg3200221032	Pkg3200211033	Pkg3200211032	Pkg3200231032	Pkg3200231033	Pkg3200211032	Pkg3200221032	Pkg3200211032	Pkg3200211034
GHGI [kg/m2]	4.62	4.62	4.62	4.56	4.62	4.62	0.66	4.56	4.53	4.62
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	10.4	10.2	10.3	10.5	10	10	15.6	10.2	10.5	10.2
Output: MEUI [kWh/(m2 * yr)]	27.2	27.1	27.1	26.9	27	27	18.1	26.8	26.7	27.1
Output: Better than ERS (%)	3330.0%	3310.0%	3320.0%	3280.0%	3300.0%	3300.0%	1580.0%	3250.0%	3240.0%	3310.0%
Output: Better than Envelope (%)	7360.0%	7430.0%	7390.0%	7360.0%	7470.0%	7460.0%	6050.0%	7430.0%	7360.0%	7410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	448	566	497	447	609	596	12759	565	446	543
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 63.1	$ 79.79	$ 70.12	$ 62.98	$ 85.93	$ 83.98	$ 1,798.99	$ 79.68	$ 62.9	$ 76.56
Annual savings in carbon tax for electricity [$/year]	$ .22	$ .28	$ .25	$ .22	$ .3	$ .3	$ 6.38	$ .28	$ .22	$ .27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 63.32	$ 80.07	$ 70.37	$ 63.21	$ 86.23	$ 84.28	$ 1,805.37	$ 79.96	$ 63.12	$ 76.83
Annual savings in GHG from electricity savings [kg CO2e/year]	4.9	6.2	5.5	4.9	6.7	6.6	140.3	6.2	4.9	6
Annual savings in natural gas [m3/year]	172.33	172.33	172.33	173.41	172.33	172.33	253.34	173.41	174.11	172.33
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,596.6	$ 1,596.6	$ 1,596.6	$ 1,606.68	$ 1,596.6	$ 1,596.6	$ 2,347.18	$ 1,606.68	$ 1,613.14	$ 1,596.6
Annual savings in carbon tax for natural gas [$/year]	$ 398.5	$ 398.5	$ 398.5	$ 401.02	$ 398.5	$ 398.5	$ 585.84	$ 401.02	$ 402.63	$ 398.5
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,995.11	$ 1,995.11	$ 1,995.11	$ 2,007.7	$ 1,995.11	$ 1,995.11	$ 2,933.02	$ 2,007.7	$ 2,015.77	$ 1,995.11
Annual savings in GHG from natural gas savings [kg CO2e/year]	8855.7	8855.7	8855.7	8911.6	8855.7	8855.7	13018.8	8911.6	8947.4	8855.7
Net Present Value [$]	$ 6,582.86	$ 6,592.13	$ 6,271.04	$ 6,275.26	$ 6,425.17	$ 6,228.63	$ 9,977.59	$ 6,284.7	$ 6,130.55	$ 5,888.62
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	BC ExpFloor R32	NA	BC ExpFloor R32	NA	NA
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	5.64	4.67	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$ 295.47	$.	$ 295.47	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.	$.

ROWHOUSE Vancouver: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 34,084.11	$ 34,379.58	$ 34,524.11	$ 34,634.11	$ 34,658.64	$ 34,819.58	$ 34,929.58	$ 34,934.11	$ 35,024.11	$ 35,074.11
ICC with multiplier (Van=1.0,this Cz =1)	$ 34,084.11	$ 34,379.58	$ 34,524.11	$ 34,634.11	$ 34,658.64	$ 34,819.58	$ 34,929.58	$ 34,934.11	$ 35,024.11	$ 35,074.11
Net Present Value [$]	$ 9,977.59	$ 9,924.32	$ 10,221.12	$ 10,072.4	$ 10,048.36	$ 10,235.6	$ 10,019.5	$ 10,079.9	$ 10,635.13	$ 10,316.3
Incremental dollars per GHG saving	$ 2.65	$ 2.67	$ 2.68	$ 2.69	$ 2.69	$ 2.7	$ 2.71	$ 2.71	$ 2.72	$ 2.72
Auxiliary Energy Required Heating [GJ/yr]	57.1	55.9	56.6	56.8	55.3	55.4	55.6	56.7	56.2	56.3
Annual Energy DHW [GJ/yr]	41.7	41.7	41.7	41.2	41.7	41.7	41.2	40.8	41.7	41.2
Annual Energy Space Heating [GJ/yr]	20.4	20	20.2	20.4	19.7	19.8	19.9	20.3	20.1	20.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	220.2	219.7	219.9	219.5	219.4	219.5	219	219.1	219.8	219.2
Design Heating Load [W]	16263.4	16073.4	16175.7	16263.4	15971.3	15985.7	16073.4	16263.4	16156.9	16175.7
Annual Energy Electricity [kWh/yr]	61153.6	61018.1	61077.3	60976.8	60957.9	60968.1	60841.5	60863.2	61043.9	60900.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,589.92	$ 8,570.75	$ 8,579.12	$ 8,564.9	$ 8,562.23	$ 8,563.67	$ 8,545.76	$ 8,548.83	$ 8,574.4	$ 8,554.12
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	17782	18430	17800	17783	19078	18448	18431	17784	17818	17801
Upgrade Package List	Pkg3200211032	Pkg3200221032	Pkg3200211033	Pkg3200211032	Pkg3200231032	Pkg3200231033	Pkg3200221032	Pkg3200211032	Pkg3200211034	Pkg3200211033
GHGI [kg/m2]	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
% ICC	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	15.6	15.3	15.5	15.5	15.1	15.2	15.2	15.5	15.4	15.4
Output: MEUI [kWh/(m2 * yr)]	18.1	17.9	18	17.9	17.9	17.9	17.8	17.8	18	17.8
Output: Better than ERS (%)	1580.0%	1560.0%	1570.0%	1550.0%	1540.0%	1550.0%	1520.0%	1530.0%	1560.0%	1530.0%
Output: Better than Envelope (%)	6050.0%	6130.0%	6090.0%	6070.0%	6180.0%	6170.0%	6150.0%	6080.0%	6110.0%	6110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	12759	12623	12682	12582	12563	12573	12447	12468	12649	12506
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,798.99	$ 1,779.89	$ 1,788.23	$ 1,774.06	$ 1,771.4	$ 1,772.84	$ 1,754.98	$ 1,758.04	$ 1,783.52	$ 1,763.32
Annual savings in carbon tax for electricity [$/year]	$ 6.38	$ 6.31	$ 6.34	$ 6.29	$ 6.28	$ 6.29	$ 6.22	$ 6.23	$ 6.32	$ 6.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,805.37	$ 1,786.2	$ 1,794.57	$ 1,780.35	$ 1,777.68	$ 1,779.12	$ 1,761.21	$ 1,764.28	$ 1,789.85	$ 1,769.57
Annual savings in GHG from electricity savings [kg CO2e/year]	140.3	138.9	139.5	138.4	138.2	138.3	136.9	137.2	139.1	137.6
Annual savings in natural gas [m3/year]	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34	253.34
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18	$ 2,347.18
Annual savings in carbon tax for natural gas [$/year]	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84	$ 585.84
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02	$ 2,933.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8	13018.8
Net Present Value [$]	$ 9,977.59	$ 9,924.32	$ 10,221.12	$ 10,072.4	$ 10,048.36	$ 10,235.6	$ 10,019.5	$ 10,079.9	$ 10,635.13	$ 10,316.3
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	5.64	5.64	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$ 295.47	$ 295.47	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.

ROWHOUSE Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 33,605.58	$ 33,310.11	$ 33,884.64	$ 34,155.58	$ 33,860.11	$ 33,750.11	$ 34,045.58	$ 34,455.58	$ 34,160.11	$ 34,434.64
ICC with multiplier (Van=1.0,this Cz =1)	$ 33,605.58	$ 33,310.11	$ 33,884.64	$ 34,155.58	$ 33,860.11	$ 33,750.11	$ 34,045.58	$ 34,455.58	$ 34,160.11	$ 34,434.64
Net Present Value [$]	$ 6,592.13	$ 6,582.86	$ 6,425.17	$ 6,284.7	$ 6,275.26	$ 6,271.04	$ 6,228.63	$ 6,140.18	$ 6,130.55	$ 6,117.57
Incremental dollars per GHG saving	$ 3.79	$ 3.76	$ 3.82	$ 3.83	$ 3.8	$ 3.81	$ 3.84	$ 3.85	$ 3.82	$ 3.86
Auxiliary Energy Required Heating [GJ/yr]	37.1	38.2	36.6	37.2	38.2	37.7	36.7	37.2	38.2	36.6
Annual Energy DHW [GJ/yr]	81	81	81	79.9	79.9	81	81	79.2	79.2	79.9
Annual Energy Space Heating [GJ/yr]	13.4	13.9	13.3	13.4	13.9	13.7	13.3	13.4	13.9	13.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	253.2	253.6	253	252.1	252.5	253.4	253	251.4	251.8	251.9
Design Heating Load [W]	15986.3	16176.3	15884.2	15986.3	16176.3	16088.6	15898.6	15986.3	16176.3	15884.2
Annual Energy Electricity [kWh/yr]	47828.9	47947.3	47785.4	47829.7	47948.1	47897.5	47799.2	47830.2	47948.7	47786.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,704.47	$ 6,721.23	$ 6,698.32	$ 6,704.59	$ 6,721.34	$ 6,714.18	$ 6,700.27	$ 6,704.66	$ 6,721.43	$ 6,698.43
Annual Energy Natural Gas [m3/yr]	2174.3	2174.3	2174.3	2145.1	2145.1	2174.3	2174.3	2126.4	2126.4	2145.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 937.92	$ 937.92	$ 937.92	$ 925.32	$ 925.32	$ 937.92	$ 937.92	$ 917.25	$ 917.25	$ 925.32
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	18427	17779	19075	18428	17780	17797	18445	18429	17781	19076
Upgrade Package List	Pkg3200221032	Pkg3200211032	Pkg3200231032	Pkg3200221032	Pkg3200211032	Pkg3200211033	Pkg3200221033	Pkg3200221032	Pkg3200211032	Pkg3200231032
GHGI [kg/m2]	4.62	4.62	4.62	4.56	4.56	4.62	4.62	4.53	4.53	4.56
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	10.2	10.4	10	10.2	10.5	10.3	10	10.2	10.5	10
Output: MEUI [kWh/(m2 * yr)]	27.1	27.2	27	26.8	26.9	27.1	27	26.6	26.7	26.7
Output: Better than ERS (%)	3310.0%	3330.0%	3300.0%	3250.0%	3280.0%	3320.0%	3300.0%	3220.0%	3240.0%	3240.0%
Output: Better than Envelope (%)	7430.0%	7360.0%	7470.0%	7430.0%	7360.0%	7390.0%	7460.0%	7430.0%	7360.0%	7470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	566	448	609	565	447	497	596	565	446	609
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 79.79	$ 63.1	$ 85.93	$ 79.68	$ 62.98	$ 70.12	$ 83.98	$ 79.61	$ 62.9	$ 85.81
Annual savings in carbon tax for electricity [$/year]	$ .28	$ .22	$ .3	$ .28	$ .22	$ .25	$ .3	$ .28	$ .22	$ .3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 80.07	$ 63.32	$ 86.23	$ 79.96	$ 63.21	$ 70.37	$ 84.28	$ 79.89	$ 63.12	$ 86.12
Annual savings in GHG from electricity savings [kg CO2e/year]	6.2	4.9	6.7	6.2	4.9	5.5	6.6	6.2	4.9	6.7
Annual savings in natural gas [m3/year]	172.33	172.33	172.33	173.41	173.41	172.33	172.33	174.11	174.11	173.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,596.6	$ 1,596.6	$ 1,596.6	$ 1,606.68	$ 1,606.68	$ 1,596.6	$ 1,596.6	$ 1,613.14	$ 1,613.14	$ 1,606.68
Annual savings in carbon tax for natural gas [$/year]	$ 398.5	$ 398.5	$ 398.5	$ 401.02	$ 401.02	$ 398.5	$ 398.5	$ 402.63	$ 402.63	$ 401.02
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,995.11	$ 1,995.11	$ 1,995.11	$ 2,007.7	$ 2,007.7	$ 1,995.11	$ 1,995.11	$ 2,015.77	$ 2,015.77	$ 2,007.7
Annual savings in GHG from natural gas savings [kg CO2e/year]	8855.7	8855.7	8855.7	8911.6	8911.6	8855.7	8855.7	8947.4	8947.4	8911.6
Net Present Value [$]	$ 6,592.13	$ 6,582.86	$ 6,425.17	$ 6,284.7	$ 6,275.26	$ 6,271.04	$ 6,228.63	$ 6,140.18	$ 6,130.55	$ 6,117.57
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	BC ExpFloor R32	NA	BC ExpFloor R36	BC ExpFloor R32	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R36
Exposed Floor RSI	5.64	4.67	6.34	5.64	4.67	4.67	5.64	5.64	4.67	6.34
Exposed Floor Cost of Upgrade	$ 295.47	$.	$ 574.53	$ 295.47	$.	$.	$ 295.47	$ 295.47	$.	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$ 550.

ROWHOUSE Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 12,368.64	$ 12,818.64	$ 12,818.64	$ 12,868.64	$ 12,868.64	$ 12,918.64	$ 13,118.64	$ 13,118.64	$ 13,128.64	$ 13,218.64
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 13,271.55	$ 13,754.4	$ 13,754.4	$ 13,808.05	$ 13,808.05	$ 13,861.7	$ 14,076.3	$ 14,076.3	$ 14,087.03	$ 14,183.6
Net Present Value [$]	$ 16,850.86	$ 15,321.47	$ 15,321.47	$ 19,266.9	$ 19,266.9	$ 16,542.05	$ 15,205.88	$ 15,205.88	$ 19,159.9	$ 16,396.74
Incremental dollars per GHG saving	$ 2.67	$ 2.95	$ 2.95	$ 2.44	$ 2.44	$ 2.75	$ 2.99	$ 2.99	$ 2.9	$ 2.8
Auxiliary Energy Required Heating [GJ/yr]	136.4	122.3	122.3	124.6	124.6	136.4	122.3	122.3	118.1	136.4
Annual Energy DHW [GJ/yr]	81	101.2	101.2	81	81	79.9	100.4	100.4	102.5	79.2
Annual Energy Space Heating [GJ/yr]	144.4	129.6	129.6	132	132	144.4	129.6	129.6	125.1	144.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	1.5	6.2
Total Energy [GJ/yr]	385.4	390.7	390.7	372.9	372.9	384.3	389.9	389.9	382.8	383.6
Design Heating Load [W]	27456.8	25403.9	25403.9	25262.7	25262.7	27456.8	25403.8	25403.9	27194.8	27456.8
Annual Energy Electricity [kWh/yr]	45161.7	45087.6	45087.6	45099.4	45099.4	45161.7	45087.6	45087.6	43750.9	45161.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,327.07	$ 6,316.58	$ 6,316.58	$ 6,318.25	$ 6,318.25	$ 6,327.07	$ 6,316.58	$ 6,316.58	$ 6,127.44	$ 6,327.08
Annual Energy Natural Gas [m3/yr]	5982.5	6134.1	6134.1	5653.5	5653.5	5953.7	6112.1	6112.1	6049.7	5935.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,580.64	$ 2,646.04	$ 2,646.04	$ 2,438.72	$ 2,438.72	$ 2,568.22	$ 2,636.55	$ 2,636.55	$ 2,609.63	$ 2,560.24
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32890	32942	33482	32944	33484	32891	32943	33483	32905	32892
Upgrade Package List	Pkg1100101011	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg1100101011	Pkg2100101011	Pkg2100111011	Pkg1100101012	Pkg1100101011
GHGI [kg/m2]	11.77	12.06	12.06	11.15	11.15	11.72	12.01	12.01	11.88	11.68
% ICC	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 2.5	ACH 1.5	ACH 1.5	ACH 2.5	ACH 2.5
Output: TEDI [kWh/(m2 * yr)]	37.3	33.5	33.5	34.1	34.1	37.3	33.5	33.5	32.3	37.3
Output: MEUI [kWh/(m2 * yr)]	63.4	64.8	64.8	60	60	63.1	64.6	64.6	62.7	62.9
Output: Better than ERS (%)	6480.0%	6400.0%	6400.0%	5950.0%	5950.0%	6440.0%	6370.0%	6370.0%	6070.0%	6410.0%
Output: Better than Envelope (%)	2090.0%	2910.0%	2910.0%	2770.0%	2770.0%	2090.0%	2910.0%	2910.0%	3150.0%	2090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	3533	3607	3607	3596	3596	3533	3607	3607	4944	3533
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 498.2	$ 508.64	$ 508.64	$ 506.98	$ 506.98	$ 498.2	$ 508.64	$ 508.64	$ 697.12	$ 498.18
Annual savings in carbon tax for electricity [$/year]	$ 1.77	$ 1.8	$ 1.8	$ 1.8	$ 1.8	$ 1.77	$ 1.8	$ 1.8	$ 2.47	$ 1.77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 499.96	$ 510.45	$ 510.45	$ 508.78	$ 508.78	$ 499.96	$ 510.45	$ 510.45	$ 699.59	$ 499.95
Annual savings in GHG from electricity savings [kg CO2e/year]	38.9	39.7	39.7	39.6	39.6	38.9	39.7	39.7	54.4	38.9
Annual savings in natural gas [m3/year]	89.51	83.86	83.86	101.77	101.77	90.58	84.68	84.68	87.01	91.27
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 829.32	$ 776.98	$ 776.98	$ 942.89	$ 942.89	$ 839.26	$ 784.58	$ 784.58	$ 806.12	$ 845.65
Annual savings in carbon tax for natural gas [$/year]	$ 206.99	$ 193.93	$ 193.93	$ 235.34	$ 235.34	$ 209.48	$ 195.83	$ 195.83	$ 201.2	$ 211.07
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,036.31	$ 970.92	$ 970.92	$ 1,178.23	$ 1,178.23	$ 1,048.73	$ 980.41	$ 980.41	$ 1,007.32	$ 1,056.72
Annual savings in GHG from natural gas savings [kg CO2e/year]	4599.9	4309.6	4309.6	5229.8	5229.8	4655	4351.7	4351.7	4471.2	4690.4
Net Present Value [$]	$ 16,850.86	$ 15,321.47	$ 15,321.47	$ 19,266.9	$ 19,266.9	$ 16,542.05	$ 15,205.88	$ 15,205.88	$ 19,159.9	$ 16,396.74
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	NA
DHW System Code	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$.
DHW System Cost of Upgrade	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 550.	$.	$.	$ 550.	$ 850.	$ 850.	$.	$ 850.

ROWHOUSE Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 16,792.64	$ 16,792.64	$ 17,342.64	$ 17,342.64	$ 17,652.64	$ 17,642.64	$ 17,642.64	$ 17,912.98	$ 17,912.98	$ 18,092.64
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 18,018.5	$ 18,018.5	$ 18,608.65	$ 18,608.65	$ 18,941.28	$ 18,930.55	$ 18,930.55	$ 19,220.63	$ 19,220.63	$ 19,413.4
Net Present Value [$]	$ 18,495.05	$ 18,495.05	$ 18,573.98	$ 18,573.98	$ 13,621.7	$ 18,570.35	$ 18,570.35	$ 18,992.05	$ 18,992.05	$ 13,859.03
Incremental dollars per GHG saving	$ 1.07	$ 1.07	$ 1.1	$ 1.1	$ 1.12	$ 1.12	$ 1.12	$ 1.14	$ 1.14	$ 1.15
Auxiliary Energy Required Heating [GJ/yr]	149.1	149.1	148.8	148.8	144.5	148.6	148.6	146.8	146.8	143.7
Annual Energy DHW [GJ/yr]	41.7	41.7	41.1	41.1	41.7	40.8	40.8	41.7	41.7	41.7
Annual Energy Space Heating [GJ/yr]	64.7	64.7	64.5	64.5	61.6	64.4	64.4	63.8	63.8	61.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	1.5	6.2	6.2	6.2	6.2	1.5
Total Energy [GJ/yr]	275.9	275.9	275.2	275.2	267.9	274.8	274.8	275	275	267.6
Design Heating Load [W]	26152.4	26152.5	26152.4	26152.5	28378.4	26152.4	26152.5	25833	25833	28266.5
Annual Energy Electricity [kWh/yr]	76637.4	76637.4	76454.4	76454.4	74410.4	76336.5	76336.5	76395.3	76395.3	74331.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,780.88	$ 10,780.88	$ 10,754.98	$ 10,754.98	$ 10,465.76	$ 10,738.3	$ 10,738.3	$ 10,746.62	$ 10,746.62	$ 10,454.62
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32956	33496	32957	33497	32920	32958	33498	33226	33766	32938
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg1100101012	Pkg2100101011	Pkg2100111011	Pkg2100102011	Pkg2100112011	Pkg1100101013
GHGI [kg/m2]	0.83	0.83	0.83	0.83	0.81	0.83	0.83	0.83	0.83	0.81
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	40.8	40.8	40.7	40.7	39.5	40.6	40.6	40.1	40.1	39.3
Output: MEUI [kWh/(m2 * yr)]	33	33	32.8	32.8	30.8	32.7	32.7	32.8	32.8	30.7
Output: Better than ERS (%)	1730.0%	1730.0%	1700.0%	1700.0%	1390.0%	1680.0%	1680.0%	1690.0%	1690.0%	1370.0%
Output: Better than Envelope (%)	1350.0%	1350.0%	1370.0%	1370.0%	1620.0%	1380.0%	1380.0%	1480.0%	1480.0%	1660.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	27942	27942	27759	27759	25715	27642	27642	27700	27700	25637
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,939.88	$ 3,939.88	$ 3,914.08	$ 3,914.08	$ 3,625.87	$ 3,897.45	$ 3,897.45	$ 3,905.74	$ 3,905.74	$ 3,614.77
Annual savings in carbon tax for electricity [$/year]	$ 13.97	$ 13.97	$ 13.88	$ 13.88	$ 12.86	$ 13.82	$ 13.82	$ 13.85	$ 13.85	$ 12.82
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,953.85	$ 3,953.85	$ 3,927.96	$ 3,927.96	$ 3,638.73	$ 3,911.27	$ 3,911.27	$ 3,919.59	$ 3,919.59	$ 3,627.59
Annual savings in GHG from electricity savings [kg CO2e/year]	307.4	307.4	305.4	305.4	282.9	304.1	304.1	304.7	304.7	282
Annual savings in natural gas [m3/year]	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5
Annual savings in carbon tax for natural gas [$/year]	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95
Annual savings in GHG from natural gas savings [kg CO2e/year]	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5
Net Present Value [$]	$ 18,495.05	$ 18,495.05	$ 18,573.98	$ 18,573.98	$ 13,621.7	$ 18,570.35	$ 18,570.35	$ 18,992.05	$ 18,992.05	$ 13,859.03
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	NA	NA	NA	NA	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,360.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.	$.	$.

ROWHOUSE Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,228.64	$ 14,228.64	$ 14,668.64	$ 14,668.64	$ 14,778.64	$ 14,778.64	$ 15,078.64	$ 15,078.64	$ 15,348.98	$ 15,348.98
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 15,267.33	$ 15,267.33	$ 15,739.45	$ 15,739.45	$ 15,857.48	$ 15,857.48	$ 16,179.38	$ 16,179.38	$ 16,469.46	$ 16,469.46
Net Present Value [$]	$ 25,278.93	$ 25,278.93	$ 25,013.43	$ 25,013.43	$ 24,969.76	$ 24,969.76	$ 24,824.81	$ 24,824.81	$ 24,715.14	$ 24,715.14
Incremental dollars per GHG saving	$ 2.32	$ 2.32	$ 2.37	$ 2.37	$ 2.38	$ 2.38	$ 2.42	$ 2.42	$ 2.45	$ 2.45
Auxiliary Energy Required Heating [GJ/yr]	108.5	108.5	107.8	107.8	108.5	108.5	108.5	108.5	106.2	106.2
Annual Energy DHW [GJ/yr]	81	81	81	81	79.9	79.9	79.2	79.2	81	81
Annual Energy Space Heating [GJ/yr]	114.9	114.9	114.1	114.1	114.9	114.9	114.9	114.9	112.5	112.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	351.1	351.1	350.3	350.3	350	350	349.3	349.3	348.7	348.7
Design Heating Load [W]	24823.1	24823.1	24711.2	24711.2	24823.1	24823.1	24823.1	24823.1	24503.7	24503.7
Annual Energy Electricity [kWh/yr]	43700	43700	43696.3	43696.3	43700.1	43700.1	43700.1	43700.1	43688.1	43688.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,120.24	$ 6,120.24	$ 6,119.71	$ 6,119.71	$ 6,120.25	$ 6,120.25	$ 6,120.25	$ 6,120.25	$ 6,118.55	$ 6,118.55
Annual Energy Natural Gas [m3/yr]	5203.5	5203.5	5183.8	5183.8	5174.7	5174.7	5156.2	5156.2	5140.7	5140.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,244.61	$ 2,244.61	$ 2,236.11	$ 2,236.11	$ 2,232.19	$ 2,232.19	$ 2,224.2	$ 2,224.2	$ 2,217.52	$ 2,217.52
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32962	33502	32980	33520	32963	33503	32964	33504	33232	33772
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100102012	Pkg2100112012
GHGI [kg/m2]	10.29	10.29	10.25	10.25	10.23	10.23	10.2	10.2	10.17	10.17
% ICC	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	29.7	29.7	29.5	29.5	29.7	29.7	29.7	29.7	29.1	29.1
Output: MEUI [kWh/(m2 * yr)]	54	54	53.8	53.8	53.7	53.7	53.5	53.5	53.3	53.3
Output: Better than ERS (%)	5020.0%	5020.0%	4980.0%	4980.0%	4970.0%	4970.0%	4940.0%	4940.0%	4910.0%	4910.0%
Output: Better than Envelope (%)	3710.0%	3710.0%	3750.0%	3750.0%	3710.0%	3710.0%	3710.0%	3710.0%	3840.0%	3840.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	4995	4995	4999	4999	4995	4995	4995	4995	5007	5007
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 704.3	$ 704.3	$ 704.82	$ 704.82	$ 704.28	$ 704.28	$ 704.28	$ 704.28	$ 705.97	$ 705.97
Annual savings in carbon tax for electricity [$/year]	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5	$ 2.5
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 706.79	$ 706.79	$ 707.32	$ 707.32	$ 706.78	$ 706.78	$ 706.78	$ 706.78	$ 708.48	$ 708.48
Annual savings in GHG from electricity savings [kg CO2e/year]	54.9	54.9	55	55	54.9	54.9	54.9	54.9	55.1	55.1
Annual savings in natural gas [m3/year]	118.54	118.54	119.27	119.27	119.61	119.61	120.3	120.3	120.88	120.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,098.23	$ 1,098.23	$ 1,105.03	$ 1,105.03	$ 1,108.17	$ 1,108.17	$ 1,114.56	$ 1,114.56	$ 1,119.91	$ 1,119.91
Annual savings in carbon tax for natural gas [$/year]	$ 274.11	$ 274.11	$ 275.81	$ 275.81	$ 276.59	$ 276.59	$ 278.19	$ 278.19	$ 279.52	$ 279.52
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,372.35	$ 1,372.35	$ 1,380.84	$ 1,380.84	$ 1,384.77	$ 1,384.77	$ 1,392.75	$ 1,392.75	$ 1,399.43	$ 1,399.43
Annual savings in GHG from natural gas savings [kg CO2e/year]	6091.4	6091.4	6129.1	6129.1	6146.6	6146.6	6182	6182	6211.7	6211.7
Net Present Value [$]	$ 25,278.93	$ 25,278.93	$ 25,013.43	$ 25,013.43	$ 24,969.76	$ 24,969.76	$ 24,824.81	$ 24,824.81	$ 24,715.14	$ 24,715.14
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.

ROWHOUSE Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 15,418.64	$ 15,418.64	$ 15,442.64	$ 15,442.64	$ 15,552.64	$ 15,552.64	$ 15,852.64	$ 15,852.64	$ 15,968.64	$ 15,968.64
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 16,544.2	$ 16,544.2	$ 16,569.95	$ 16,569.95	$ 16,687.98	$ 16,687.98	$ 17,009.88	$ 17,009.88	$ 17,134.35	$ 17,134.35
Net Present Value [$]	$ 4,127.97	$ 4,127.97	$ 6,744.18	$ 6,744.18	$ 6,926.32	$ 6,926.32	$ 6,932.95	$ 6,932.95	$ 4,391.41	$ 4,391.41
Incremental dollars per GHG saving	$ 1.45	$ 1.45	$ 1.73	$ 1.73	$ 1.74	$ 1.74	$ 1.77	$ 1.77	$ 1.49	$ 1.49
Auxiliary Energy Required Heating [GJ/yr]	122.3	122.3	131.6	131.6	132	132	131.7	131.7	122.3	122.3
Annual Energy DHW [GJ/yr]	102.5	102.5	41.7	41.7	41.1	41.1	40.8	40.8	101.2	101.2
Annual Energy Space Heating [GJ/yr]	53.1	53.1	139.4	139.4	139.8	139.8	139.5	139.5	53.1	53.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	1.5	1.5	1.5	1.5	1.5	1.5	6.2	6.2
Total Energy [GJ/yr]	328	328	336.3	336.3	336.2	336.2	335.6	335.6	326.7	326.7
Design Heating Load [W]	26152.4	26152.5	24852.4	24852.4	24964.3	24964.3	24964.3	24964.3	26152.4	26152.5
Annual Energy Electricity [kWh/yr]	62638.8	62638.8	55401.7	55401.7	55251.8	55251.8	55152.9	55152.9	62638.8	62638.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,800.08	$ 8,800.08	$ 7,776.03	$ 7,776.03	$ 7,754.81	$ 7,754.81	$ 7,740.82	$ 7,740.82	$ 8,800.08	$ 8,800.08
Annual Energy Natural Gas [m3/yr]	2751.3	2751.3	3674.8	3674.8	3686	3686	3679.8	3679.8	2717.1	2717.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,186.81	$ 1,186.81	$ 1,585.18	$ 1,585.18	$ 1,590.01	$ 1,590.01	$ 1,587.34	$ 1,587.34	$ 1,172.06	$ 1,172.06
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	32950	33490	32983	33523	32966	33506	32967	33507	32951	33491
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011
GHGI [kg/m2]	5.87	5.87	7.53	7.53	7.55	7.55	7.54	7.54	5.8	5.8
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33.5	33.5	36	36	36.1	36.1	36	36	33.5	33.5
Output: MEUI [kWh/(m2 * yr)]	47.1	47.1	49.9	49.9	49.9	49.9	49.7	49.7	46.7	46.7
Output: Better than ERS (%)	3650.0%	3650.0%	4370.0%	4370.0%	4370.0%	4370.0%	4340.0%	4340.0%	3600.0%	3600.0%
Output: Better than Envelope (%)	2910.0%	2910.0%	2370.0%	2370.0%	2340.0%	2340.0%	2360.0%	2360.0%	2910.0%	2910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	13944	13944	6707	6707	6557	6557	6458	6458	13944	13944
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,966.08	$ 1,966.08	$ 945.64	$ 945.64	$ 924.51	$ 924.51	$ 910.56	$ 910.56	$ 1,966.08	$ 1,966.08
Annual savings in carbon tax for electricity [$/year]	$ 6.97	$ 6.97	$ 3.35	$ 3.35	$ 3.28	$ 3.28	$ 3.23	$ 3.23	$ 6.97	$ 6.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,973.05	$ 1,973.05	$ 949.	$ 949.	$ 927.79	$ 927.79	$ 913.79	$ 913.79	$ 1,973.05	$ 1,973.05
Annual savings in GHG from electricity savings [kg CO2e/year]	153.4	153.4	73.8	73.8	72.1	72.1	71	71	153.4	153.4
Annual savings in natural gas [m3/year]	209.9	209.9	175.49	175.49	175.08	175.08	175.31	175.31	211.18	211.18
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,944.74	$ 1,944.74	$ 1,625.94	$ 1,625.94	$ 1,622.08	$ 1,622.08	$ 1,624.22	$ 1,624.22	$ 1,956.55	$ 1,956.55
Annual savings in carbon tax for natural gas [$/year]	$ 485.4	$ 485.4	$ 405.83	$ 405.83	$ 404.86	$ 404.86	$ 405.4	$ 405.4	$ 488.34	$ 488.34
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,430.14	$ 2,430.14	$ 2,031.77	$ 2,031.77	$ 2,026.94	$ 2,026.94	$ 2,029.62	$ 2,029.62	$ 2,444.89	$ 2,444.89
Annual savings in GHG from natural gas savings [kg CO2e/year]	10786.6	10786.6	9018.4	9018.4	8997	8997	9008.8	9008.8	10852.1	10852.1
Net Present Value [$]	$ 4,127.97	$ 4,127.97	$ 6,744.18	$ 6,744.18	$ 6,926.32	$ 6,926.32	$ 6,932.95	$ 6,932.95	$ 4,391.41	$ 4,391.41
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$.	$.	$.	$.	$.	$.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$.	$.
DHW System Cost of Upgrade	$.	$.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,152.64	$ 18,152.64	$ 18,592.64	$ 18,592.64	$ 18,702.64	$ 18,702.64	$ 19,002.64	$ 19,002.64	$ 19,142.64	$ 19,142.64
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 19,477.78	$ 19,477.78	$ 19,949.9	$ 19,949.9	$ 20,067.93	$ 20,067.93	$ 20,389.83	$ 20,389.83	$ 20,540.05	$ 20,540.05
Net Present Value [$]	$ 10,260.58	$ 10,260.58	$ 10,499.19	$ 10,499.19	$ 10,342.06	$ 10,342.06	$ 10,340.07	$ 10,340.07	$ 10,580.67	$ 10,580.67
Incremental dollars per GHG saving	$ 1.15	$ 1.15	$ 1.18	$ 1.18	$ 1.18	$ 1.18	$ 1.2	$ 1.2	$ 1.21	$ 1.21
Auxiliary Energy Required Heating [GJ/yr]	132.3	132.3	131.6	131.6	132	132	131.7	131.7	131.2	131.2
Annual Energy DHW [GJ/yr]	41.7	41.7	41.7	41.7	41.1	41.1	40.8	40.8	41.1	41.1
Annual Energy Space Heating [GJ/yr]	56.2	56.2	55.9	55.9	56.1	56.1	56	56	55.8	55.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	262.5	262.5	262.2	262.2	261.8	261.8	261.4	261.4	261.5	261.5
Design Heating Load [W]	25712.9	25712.9	25601	25601	25712.9	25712.9	25712.9	25712.9	25601	25601
Annual Energy Electricity [kWh/yr]	72910.6	72910.6	72832.4	72832.4	72728.6	72728.6	72611.3	72611.3	72650.4	72650.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,253.53	$ 10,253.53	$ 10,242.47	$ 10,242.47	$ 10,227.78	$ 10,227.78	$ 10,211.18	$ 10,211.18	$ 10,216.72	$ 10,216.72
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	32974	33514	32992	33532	32975	33515	32976	33516	32993	33533
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013
GHGI [kg/m2]	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	36.2	36.2	36	36	36.1	36.1	36	36	35.9	35.9
Output: MEUI [kWh/(m2 * yr)]	29.3	29.3	29.3	29.3	29.1	29.1	29	29	29.1	29.1
Output: Better than ERS (%)	1160.0%	1160.0%	1140.0%	1140.0%	1130.0%	1130.0%	1110.0%	1110.0%	1110.0%	1110.0%
Output: Better than Envelope (%)	2330.0%	2330.0%	2370.0%	2370.0%	2340.0%	2340.0%	2360.0%	2360.0%	2390.0%	2390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	24216	24216	24137	24137	24034	24034	23916	23916	23955	23955
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,414.4	$ 3,414.4	$ 3,403.37	$ 3,403.37	$ 3,388.74	$ 3,388.74	$ 3,372.2	$ 3,372.2	$ 3,377.71	$ 3,377.71
Annual savings in carbon tax for electricity [$/year]	$ 12.11	$ 12.11	$ 12.07	$ 12.07	$ 12.02	$ 12.02	$ 11.96	$ 11.96	$ 11.98	$ 11.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,426.51	$ 3,426.51	$ 3,415.44	$ 3,415.44	$ 3,400.75	$ 3,400.75	$ 3,384.16	$ 3,384.16	$ 3,389.69	$ 3,389.69
Annual savings in GHG from electricity savings [kg CO2e/year]	266.4	266.4	265.5	265.5	264.4	264.4	263.1	263.1	263.5	263.5
Annual savings in natural gas [m3/year]	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5
Annual savings in carbon tax for natural gas [$/year]	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95
Annual savings in GHG from natural gas savings [kg CO2e/year]	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5
Net Present Value [$]	$ 10,260.58	$ 10,260.58	$ 10,499.19	$ 10,499.19	$ 10,342.06	$ 10,342.06	$ 10,340.07	$ 10,340.07	$ 10,580.67	$ 10,580.67
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,170.15	$ 21,170.15	$ 21,610.15	$ 21,610.15	$ 21,720.15	$ 21,720.15	$ 22,020.15	$ 22,020.15	$ 22,160.15	$ 22,160.15
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 22,715.57	$ 22,715.57	$ 23,187.69	$ 23,187.69	$ 23,305.72	$ 23,305.72	$ 23,627.62	$ 23,627.62	$ 23,777.84	$ 23,777.84
Net Present Value [$]	$ 26,445.45	$ 26,445.45	$ 26,163.44	$ 26,163.44	$ 26,137.61	$ 26,137.61	$ 25,992.48	$ 25,992.48	$ 25,854.45	$ 25,854.45
Incremental dollars per GHG saving	$ 2.68	$ 2.68	$ 2.72	$ 2.72	$ 2.73	$ 2.73	$ 2.76	$ 2.76	$ 2.77	$ 2.77
Auxiliary Energy Required Heating [GJ/yr]	75.7	75.7	75.1	75.1	75.7	75.7	75.7	75.7	75.1	75.1
Annual Energy DHW [GJ/yr]	81	81	81	81	79.9	79.9	79.2	79.2	79.9	79.9
Annual Energy Space Heating [GJ/yr]	80.2	80.2	79.5	79.5	80.2	80.2	80.2	80.2	79.5	79.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	316.4	316.4	315.7	315.7	315.3	315.3	314.6	314.6	314.7	314.7
Design Heating Load [W]	22266.5	22266.5	22154.6	22154.6	22266.5	22266.5	22266.5	22266.5	22154.6	22154.6
Annual Energy Electricity [kWh/yr]	43526.9	43526.9	43523.5	43523.5	43526.9	43526.9	43527	43527	43523.6	43523.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,095.74	$ 6,095.74	$ 6,095.26	$ 6,095.26	$ 6,095.74	$ 6,095.74	$ 6,095.76	$ 6,095.76	$ 6,095.27	$ 6,095.27
Annual Energy Natural Gas [m3/yr]	4288.7	4288.7	4270.9	4270.9	4259.8	4259.8	4241.3	4241.3	4242.1	4242.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,850.	$ 1,850.	$ 1,842.32	$ 1,842.32	$ 1,837.53	$ 1,837.53	$ 1,829.55	$ 1,829.55	$ 1,829.89	$ 1,829.89
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	33070	33610	33088	33628	33071	33611	33072	33612	33089	33629
Upgrade Package List	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033	Pkg2100101032	Pkg2100111032	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033
GHGI [kg/m2]	8.56	8.56	8.53	8.53	8.5	8.5	8.47	8.47	8.47	8.47
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	20.7	20.7	20.5	20.5	20.7	20.7	20.7	20.7	20.5	20.5
Output: MEUI [kWh/(m2 * yr)]	44.5	44.5	44.3	44.3	44.2	44.2	44	44	44	44
Output: Better than ERS (%)	3530.0%	3530.0%	3500.0%	3500.0%	3490.0%	3490.0%	3460.0%	3460.0%	3460.0%	3460.0%
Output: Better than Envelope (%)	5610.0%	5610.0%	5640.0%	5640.0%	5610.0%	5610.0%	5610.0%	5610.0%	5640.0%	5640.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5168	5168	5172	5172	5168	5168	5168	5168	5171	5171
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 728.7	$ 728.7	$ 729.18	$ 729.18	$ 728.7	$ 728.7	$ 728.69	$ 728.69	$ 729.17	$ 729.17
Annual savings in carbon tax for electricity [$/year]	$ 2.58	$ 2.58	$ 2.59	$ 2.59	$ 2.58	$ 2.58	$ 2.58	$ 2.58	$ 2.59	$ 2.59
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 731.29	$ 731.29	$ 731.77	$ 731.77	$ 731.29	$ 731.29	$ 731.27	$ 731.27	$ 731.75	$ 731.75
Annual savings in GHG from electricity savings [kg CO2e/year]	56.8	56.8	56.9	56.9	56.8	56.8	56.8	56.8	56.9	56.9
Annual savings in natural gas [m3/year]	152.62	152.62	153.28	153.28	153.7	153.7	154.39	154.39	154.36	154.36
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,414.02	$ 1,414.02	$ 1,420.17	$ 1,420.17	$ 1,424.	$ 1,424.	$ 1,430.39	$ 1,430.39	$ 1,430.11	$ 1,430.11
Annual savings in carbon tax for natural gas [$/year]	$ 352.93	$ 352.93	$ 354.47	$ 354.47	$ 355.42	$ 355.42	$ 357.02	$ 357.02	$ 356.95	$ 356.95
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,766.96	$ 1,766.96	$ 1,774.64	$ 1,774.64	$ 1,779.42	$ 1,779.42	$ 1,787.4	$ 1,787.4	$ 1,787.06	$ 1,787.06
Annual savings in GHG from natural gas savings [kg CO2e/year]	7843	7843	7877.1	7877.1	7898.3	7898.3	7933.7	7933.7	7932.2	7932.2
Net Present Value [$]	$ 26,445.45	$ 26,445.45	$ 26,163.44	$ 26,163.44	$ 26,137.61	$ 26,137.61	$ 25,992.48	$ 25,992.48	$ 25,854.45	$ 25,854.45
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 33,310.11	$ 33,605.58	$ 33,750.11	$ 33,860.11	$ 33,884.64	$ 34,045.58	$ 34,084.11	$ 34,155.58	$ 34,160.11	$ 34,250.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 35,741.75	$ 36,058.79	$ 36,213.87	$ 36,331.9	$ 36,358.22	$ 36,530.91	$ 36,572.25	$ 36,648.94	$ 36,653.8	$ 36,750.37
Net Present Value [$]	$ 2,682.77	$ 2,766.35	$ 2,410.93	$ 2,374.26	$ 2,720.45	$ 2,518.61	$ 14,436.31	$ 2,457.83	$ 2,230.46	$ 2,020.85
Incremental dollars per GHG saving	$ 2.82	$ 2.84	$ 2.85	$ 2.85	$ 2.87	$ 2.88	$ 2.15	$ 2.88	$ 2.87	$ 2.9
Auxiliary Energy Required Heating [GJ/yr]	65	63.6	64.4	65	62.9	63	85.2	63.6	65	63.9
Annual Energy DHW [GJ/yr]	81	81	81	79.9	81	81	41.7	79.9	79.2	81
Annual Energy Space Heating [GJ/yr]	27.9	27.4	27.6	27.9	27	27.1	36.1	27.4	27.9	27.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	278.7	278.1	278.4	277.6	277.8	277.9	246	277.1	276.9	278.3
Design Heating Load [W]	20753.5	20511.1	20641.6	20753.5	20380.7	20399.2	20907.5	20511.1	20753.5	20617.6
Annual Energy Electricity [kWh/yr]	54922.3	54775.1	54857	54923.2	54684.5	54700.4	68344.3	54776	54923.7	54814.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,708.19	$ 7,687.36	$ 7,698.95	$ 7,708.32	$ 7,674.54	$ 7,676.79	$ 9,607.4	$ 7,687.49	$ 7,708.39	$ 7,692.91
Annual Energy Natural Gas [m3/yr]	2173.9	2173.9	2173.9	2144.8	2173.9	2173.9	0	2144.8	2126	2173.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 937.74	$ 937.74	$ 937.74	$ 925.19	$ 937.74	$ 937.74	$.	$ 925.19	$ 917.08	$ 937.74
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	50665	51313	50683	50666	51961	51331	50668	51314	50667	50701
Upgrade Package List	Pkg3200211032	Pkg3200221032	Pkg3200211033	Pkg3200211032	Pkg3200231032	Pkg3200231033	Pkg3200211032	Pkg3200221032	Pkg3200211032	Pkg3200211034
GHGI [kg/m2]	4.69	4.69	4.69	4.64	4.69	4.69	0.74	4.64	4.6	4.69
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.8	17.4	17.6	17.8	17.2	17.2	23.3	17.4	17.8	17.5
Output: MEUI [kWh/(m2 * yr)]	33.5	33.4	33.4	33.2	33.3	33.3	24.7	33.1	33	33.4
Output: Better than ERS (%)	1850.0%	1830.0%	1840.0%	1810.0%	1820.0%	1820.0%	450.0%	1790.0%	1780.0%	1840.0%
Output: Better than Envelope (%)	6230.0%	6310.0%	6260.0%	6230.0%	6350.0%	6350.0%	5060.0%	6310.0%	6230.0%	6290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6227	6080	6162	6228	5990	6005	19649	6081	6229	6119
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 878.05	$ 857.29	$ 868.84	$ 878.18	$ 844.52	$ 846.76	$ 2,770.55	$ 857.42	$ 878.25	$ 862.82
Annual savings in carbon tax for electricity [$/year]	$ 3.11	$ 3.04	$ 3.08	$ 3.11	$ 2.99	$ 3.	$ 9.82	$ 3.04	$ 3.11	$ 3.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 881.16	$ 860.33	$ 871.92	$ 881.29	$ 847.51	$ 849.76	$ 2,780.38	$ 860.46	$ 881.36	$ 865.88
Annual savings in GHG from electricity savings [kg CO2e/year]	68.5	66.9	67.8	68.5	65.9	66.1	216.1	66.9	68.5	67.3
Annual savings in natural gas [m3/year]	231.42	231.42	231.42	232.5	231.42	231.42	312.41	232.5	233.2	231.42
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,144.06	$ 2,144.06	$ 2,144.06	$ 2,154.11	$ 2,144.06	$ 2,144.06	$ 2,894.5	$ 2,154.11	$ 2,160.6	$ 2,144.06
Annual savings in carbon tax for natural gas [$/year]	$ 535.15	$ 535.15	$ 535.15	$ 537.65	$ 535.15	$ 535.15	$ 722.45	$ 537.65	$ 539.27	$ 535.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,679.21	$ 2,679.21	$ 2,679.21	$ 2,691.76	$ 2,679.21	$ 2,679.21	$ 3,616.95	$ 2,691.76	$ 2,699.87	$ 2,679.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	11892.2	11892.2	11892.2	11947.9	11892.2	11892.2	16054.5	11947.9	11983.9	11892.2
Net Present Value [$]	$ 2,682.77	$ 2,766.35	$ 2,410.93	$ 2,374.26	$ 2,720.45	$ 2,518.61	$ 14,436.31	$ 2,457.83	$ 2,230.46	$ 2,020.85
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	BC ExpFloor R32	NA	BC ExpFloor R32	NA	NA
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	5.64	4.67	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$ 295.47	$.	$ 295.47	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.	$.

ROWHOUSE Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 34,084.11	$ 34,379.58	$ 34,524.11	$ 34,634.11	$ 34,658.64	$ 34,819.58	$ 34,929.58	$ 34,934.11	$ 35,024.11	$ 35,074.11
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 36,572.25	$ 36,889.29	$ 37,044.37	$ 37,162.4	$ 37,188.72	$ 37,361.41	$ 37,479.44	$ 37,484.3	$ 37,580.87	$ 37,634.52
Net Present Value [$]	$ 14,436.31	$ 14,324.8	$ 14,695.01	$ 14,530.22	$ 14,376.72	$ 14,583.86	$ 14,418.89	$ 14,536.07	$ 15,076.69	$ 14,789.09
Incremental dollars per GHG saving	$ 2.15	$ 2.17	$ 2.18	$ 2.19	$ 2.19	$ 2.2	$ 2.21	$ 2.21	$ 2.21	$ 2.21
Auxiliary Energy Required Heating [GJ/yr]	85.2	83.7	84.5	84.9	82.9	83	83.4	84.7	84	84.2
Annual Energy DHW [GJ/yr]	41.7	41.7	41.7	41.1	41.7	41.7	41.1	40.8	41.7	41.1
Annual Energy Space Heating [GJ/yr]	36.1	35.6	35.9	36	35.2	35.3	35.5	35.9	35.7	35.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	246	245.5	245.8	245.4	245.2	245.2	244.8	245	245.6	245.1
Design Heating Load [W]	20907.5	20665.1	20795.6	20907.5	20534.7	20553.2	20665.1	20907.5	20771.6	20795.6
Annual Energy Electricity [kWh/yr]	68344.3	68186.2	68273.9	68167.1	68098	68115.9	68009.1	68052.9	68227.9	68096.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,607.4	$ 9,585.03	$ 9,597.44	$ 9,582.33	$ 9,572.55	$ 9,575.08	$ 9,559.97	$ 9,566.17	$ 9,590.93	$ 9,572.38
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	50668	51316	50686	50669	51964	51334	51317	50670	50704	50687
Upgrade Package List	Pkg3200211032	Pkg3200221032	Pkg3200211033	Pkg3200211032	Pkg3200231032	Pkg3200221033	Pkg3200221032	Pkg3200211032	Pkg3200211034	Pkg3200211033
GHGI [kg/m2]	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
% ICC	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	23.3	22.9	23.1	23.2	22.7	22.7	22.8	23.2	23	23
Output: MEUI [kWh/(m2 * yr)]	24.7	24.5	24.6	24.5	24.4	24.4	24.3	24.4	24.5	24.4
Output: Better than ERS (%)	450.0%	430.0%	450.0%	430.0%	420.0%	420.0%	400.0%	410.0%	440.0%	420.0%
Output: Better than Envelope (%)	5060.0%	5150.0%	5100.0%	5080.0%	5190.0%	5190.0%	5160.0%	5090.0%	5130.0%	5120.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	19649	19491	19579	19472	19403	19421	19314	19358	19533	19402
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,770.55	$ 2,748.26	$ 2,760.62	$ 2,745.57	$ 2,735.82	$ 2,738.35	$ 2,723.29	$ 2,729.46	$ 2,754.14	$ 2,735.65
Annual savings in carbon tax for electricity [$/year]	$ 9.82	$ 9.75	$ 9.79	$ 9.74	$ 9.7	$ 9.71	$ 9.66	$ 9.68	$ 9.77	$ 9.7
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,780.38	$ 2,758.	$ 2,770.41	$ 2,755.3	$ 2,745.52	$ 2,748.06	$ 2,732.95	$ 2,739.14	$ 2,763.91	$ 2,745.35
Annual savings in GHG from electricity savings [kg CO2e/year]	216.1	214.4	215.4	214.2	213.4	213.6	212.5	212.9	214.9	213.4
Annual savings in natural gas [m3/year]	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41	312.41
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5	$ 2,894.5
Annual savings in carbon tax for natural gas [$/year]	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45	$ 722.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95	$ 3,616.95
Annual savings in GHG from natural gas savings [kg CO2e/year]	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5	16054.5
Net Present Value [$]	$ 14,436.31	$ 14,324.8	$ 14,695.01	$ 14,530.22	$ 14,376.72	$ 14,583.86	$ 14,418.89	$ 14,536.07	$ 15,076.69	$ 14,789.09
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	5.64	5.64	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$ 295.47	$ 295.47	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.	$ 550.

ROWHOUSE Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC ASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,605.58	$ 33,884.64	$ 33,310.11	$ 34,045.58	$ 34,155.58	$ 34,324.64	$ 34,434.64	$ 33,750.11	$ 33,860.11	$ 34,455.58
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 36,058.79	$ 36,358.22	$ 35,741.75	$ 36,530.91	$ 36,648.94	$ 36,830.34	$ 36,948.37	$ 36,213.87	$ 36,331.9	$ 36,970.84
Net Present Value [$]	$ 2,766.35	$ 2,720.45	$ 2,682.77	$ 2,518.61	$ 2,457.83	$ 2,447.52	$ 2,411.94	$ 2,410.93	$ 2,374.26	$ 2,313.67
Incremental dollars per GHG saving	$ 2.84	$ 2.87	$ 2.82	$ 2.88	$ 2.88	$ 2.9	$ 2.9	$ 2.85	$ 2.85	$ 2.89
Auxiliary Energy Required Heating [GJ/yr]	63.6	62.9	65	63	63.6	62.2	62.9	64.4	65	63.6
Annual Energy DHW [GJ/yr]	81	81	81	81	79.9	81	79.9	81	79.9	79.2
Annual Energy Space Heating [GJ/yr]	27.4	27	27.9	27.1	27.4	26.8	27	27.6	27.9	27.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	278.1	277.8	278.7	277.9	277.1	277.6	276.7	278.4	277.6	276.4
Design Heating Load [W]	20511.1	20380.7	20753.5	20399.2	20511.1	20268.9	20380.7	20641.6	20753.5	20511.1
Annual Energy Electricity [kWh/yr]	54775.1	54684.5	54922.3	54700.4	54776	54619.6	54685.4	54857	54923.2	54776.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,687.36	$ 7,674.54	$ 7,708.19	$ 7,676.79	$ 7,687.49	$ 7,665.36	$ 7,674.67	$ 7,698.95	$ 7,708.32	$ 7,687.57
Annual Energy Natural Gas [m3/yr]	2173.9	2173.9	2173.9	2173.9	2144.8	2173.9	2144.8	2173.9	2144.8	2126
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 937.74	$ 937.74	$ 937.74	$ 937.74	$ 925.19	$ 937.74	$ 925.19	$ 937.74	$ 925.19	$ 917.08
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	51313	51961	50665	51331	51314	51979	51962	50683	50666	51315
Upgrade Package List	Pkg3200231032	Pkg3200231032	Pkg3200211032	Pkg3200231033	Pkg3200221032	Pkg3200231033	Pkg3200231032	Pkg3200211033	Pkg3200211032	Pkg3200221032
GHGI [kg/m2]	4.69	4.69	4.69	4.69	4.64	4.69	4.64	4.69	4.64	4.6
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.5%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	17.4	17.2	17.8	17.2	17.4	17	17.2	17.6	17.8	17.4
Output: MEUI [kWh/(m2 * yr)]	33.4	33.3	33.5	33.3	33.1	33.2	33	33.4	33.2	32.9
Output: Better than ERS (%)	1830.0%	1820.0%	1850.0%	1820.0%	1790.0%	1810.0%	1770.0%	1840.0%	1810.0%	1760.0%
Output: Better than Envelope (%)	6310.0%	6350.0%	6230.0%	6350.0%	6310.0%	6390.0%	6350.0%	6260.0%	6230.0%	6310.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6080	5990	6227	6005	6081	5925	5990	6162	6228	6082
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 857.29	$ 844.52	$ 878.05	$ 846.76	$ 857.42	$ 835.37	$ 844.65	$ 868.84	$ 878.18	$ 857.51
Annual savings in carbon tax for electricity [$/year]	$ 3.04	$ 2.99	$ 3.11	$ 3.	$ 3.04	$ 2.96	$ 3.	$ 3.08	$ 3.11	$ 3.04
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 860.33	$ 847.51	$ 881.16	$ 849.76	$ 860.46	$ 838.33	$ 847.64	$ 871.92	$ 881.29	$ 860.55
Annual savings in GHG from electricity savings [kg CO2e/year]	66.9	65.9	68.5	66.1	66.9	65.2	65.9	67.8	68.5	66.9
Annual savings in natural gas [m3/year]	231.42	231.42	231.42	231.42	232.5	231.42	232.5	231.42	232.5	233.2
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,144.06	$ 2,144.06	$ 2,144.06	$ 2,144.06	$ 2,154.11	$ 2,144.06	$ 2,154.11	$ 2,144.06	$ 2,154.11	$ 2,160.6
Annual savings in carbon tax for natural gas [$/year]	$ 535.15	$ 535.15	$ 535.15	$ 535.15	$ 537.65	$ 535.15	$ 537.65	$ 535.15	$ 537.65	$ 539.27
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,679.21	$ 2,679.21	$ 2,679.21	$ 2,679.21	$ 2,691.76	$ 2,679.21	$ 2,691.76	$ 2,679.21	$ 2,691.76	$ 2,699.87
Annual savings in GHG from natural gas savings [kg CO2e/year]	11892.2	11892.2	11892.2	11892.2	11947.9	11892.2	11947.9	11892.2	11947.9	11983.9
Net Present Value [$]	$ 2,766.35	$ 2,720.45	$ 2,682.77	$ 2,518.61	$ 2,457.83	$ 2,447.52	$ 2,411.94	$ 2,410.93	$ 2,374.26	$ 2,313.67
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R36	NA	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	NA	NA	BC ExpFloor R32
Exposed Floor RSI	5.64	6.34	4.67	5.64	5.64	6.34	6.34	4.67	4.67	5.64
Exposed Floor Cost of Upgrade	$ 295.47	$ 574.53	$.	$ 295.47	$ 295.47	$ 574.53	$ 574.53	$.	$.	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 550.	$ 850.

ROWHOUSE Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 14,228.64	$ 14,228.64	$ 14,502.64	$ 14,668.64	$ 14,668.64	$ 14,778.64	$ 14,778.64	$ 14,918.64	$ 14,942.64	$ 15,002.64
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 16,021.45	$ 16,021.45	$ 16,329.97	$ 16,516.89	$ 16,516.89	$ 16,640.75	$ 16,640.75	$ 16,798.39	$ 16,825.41	$ 16,892.97
Net Present Value [$]	$ 35,721.24	$ 35,721.24	$ 11,602.89	$ 35,523.33	$ 35,523.33	$ 35,438.94	$ 35,438.94	$ 3,536.7	$ 11,418.68	$ 15,732.87
Incremental dollars per GHG saving	$ 1.69	$ 1.69	$ 1.44	$ 1.73	$ 1.73	$ 1.75	$ 1.75	$ .95	$ 1.47	$ 1.35
Auxiliary Energy Required Heating [GJ/yr]	163.8	163.8	211.3	162.9	162.9	163.8	163.8	202.6	210.3	192.6
Annual Energy DHW [GJ/yr]	84.6	84.6	43.5	84.6	84.6	83.4	83.4	106.7	43.5	43.5
Annual Energy Space Heating [GJ/yr]	173.5	173.5	223.8	172.5	172.5	173.5	173.5	82.4	222.7	204
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	6.3	1.5	1.5
Total Energy [GJ/yr]	413.4	413.4	422.6	412.3	412.3	412.2	412.2	355.8	421.5	402.8
Design Heating Load [W]	32639	32639.1	36502.6	32493.9	32493.9	32639	32639.1	38786.8	36357.5	32867.3
Annual Energy Electricity [kWh/yr]	43992.8	43992.8	56331.7	43987.6	43987.6	43992.9	43992.9	69182.8	56326.3	56232.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,161.67	$ 6,161.67	$ 7,907.62	$ 6,160.93	$ 6,160.93	$ 6,161.68	$ 6,161.68	$ 9,726.05	$ 7,906.86	$ 7,893.64
Annual Energy Natural Gas [m3/yr]	6847.6	6847.6	5901.9	6820.3	6820.3	6815.6	6815.6	2865.4	5873	5379.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,953.82	$ 2,953.82	$ 2,545.87	$ 2,942.04	$ 2,942.04	$ 2,940.01	$ 2,940.01	$ 1,236.03	$ 2,533.41	$ 2,320.53
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	76	616	25	94	634	77	617	10	43	79
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg1100101012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg1100101011	Pkg1100101013	Pkg2100101012
GHGI [kg/m2]	13.39	13.39	11.74	13.34	13.34	13.33	13.33	6.15	11.68	10.75
% ICC	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	44.8	44.8	57.8	44.6	44.6	44.8	44.8	55.4	57.5	52.7
Output: MEUI [kWh/(m2 * yr)]	71	71	73.5	70.7	70.7	70.7	70.7	55	73.2	68.1
Output: Better than ERS (%)	3520.0%	3520.0%	3800.0%	3490.0%	3490.0%	3480.0%	3480.0%	1710.0%	3760.0%	3150.0%
Output: Better than Envelope (%)	2910.0%	2910.0%	860.0%	2950.0%	2950.0%	2910.0%	2910.0%	1230.0%	900.0%	1670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5214	5214	7124	5220	5220	5214	5214	19976	7119	7026
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 735.24	$ 735.24	$ 1,004.54	$ 735.98	$ 735.98	$ 735.23	$ 735.23	$ 2,816.55	$ 1,003.78	$ 990.61
Annual savings in carbon tax for electricity [$/year]	$ 2.61	$ 2.61	$ 3.56	$ 2.61	$ 2.61	$ 2.61	$ 2.61	$ 9.99	$ 3.56	$ 3.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 737.85	$ 737.85	$ 1,008.1	$ 738.59	$ 738.59	$ 737.84	$ 737.84	$ 2,826.53	$ 1,007.34	$ 994.12
Annual savings in GHG from electricity savings [kg CO2e/year]	57.4	57.4	78.4	57.4	57.4	57.4	57.4	219.7	78.3	77.3
Annual savings in natural gas [m3/year]	162.47	162.47	197.71	163.49	163.49	163.66	163.66	310.84	198.78	217.17
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,505.3	$ 1,505.3	$ 1,831.76	$ 1,514.72	$ 1,514.72	$ 1,516.34	$ 1,516.34	$ 2,879.97	$ 1,841.73	$ 2,012.09
Annual savings in carbon tax for natural gas [$/year]	$ 375.71	$ 375.71	$ 457.2	$ 378.07	$ 378.07	$ 378.47	$ 378.47	$ 718.83	$ 459.69	$ 502.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,881.01	$ 1,881.01	$ 2,288.95	$ 1,892.79	$ 1,892.79	$ 1,894.81	$ 1,894.81	$ 3,598.79	$ 2,301.42	$ 2,514.3
Annual savings in GHG from natural gas savings [kg CO2e/year]	8349.2	8349.2	10159.9	8401.5	8401.5	8410.5	8410.5	15973.9	10215.3	11160.2
Net Present Value [$]	$ 35,721.24	$ 35,721.24	$ 11,602.89	$ 35,523.33	$ 35,523.33	$ 35,438.94	$ 35,438.94	$ 3,536.7	$ 11,418.68	$ 15,732.87
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 3,150.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.

ROWHOUSE Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 17,652.64	$ 18,092.64	$ 18,152.64	$ 18,152.64	$ 18,202.64	$ 18,502.64	$ 18,592.64	$ 18,592.64	$ 18,642.64	$ 18,702.64
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 19,876.87	$ 20,372.31	$ 20,439.87	$ 20,439.87	$ 20,496.17	$ 20,833.97	$ 20,935.31	$ 20,935.31	$ 20,991.61	$ 21,059.17
Net Present Value [$]	$ 3,649.16	$ 3,835.55	$ 1,414.75	$ 1,414.75	$ 3,675.51	$ 3,638.82	$ 1,251.18	$ 1,251.18	$ 3,861.72	$ 1,397.53
Incremental dollars per GHG saving	$ .84	$ .86	$ .86	$ .86	$ .86	$ .88	$ .88	$ .88	$ .88	$ .88
Auxiliary Energy Required Heating [GJ/yr]	211.3	210.3	192.6	192.6	210.9	210.6	191.6	191.6	209.9	192.2
Annual Energy DHW [GJ/yr]	43.5	43.5	43.5	43.5	42.9	42.5	43.5	43.5	42.9	42.9
Annual Energy Space Heating [GJ/yr]	84.6	84.2	76.8	76.8	84.4	84.4	76.4	76.4	84.1	76.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	288.8	288.5	281.1	281.1	288.1	287.6	280.7	280.7	287.8	280.3
Design Heating Load [W]	38216.6	38071.4	34019.1	34019.1	38216.6	38216.6	33874	33874	38071.4	34019.1
Annual Energy Electricity [kWh/yr]	80234.9	80136.4	78073.7	78073.7	80031.5	79900.7	77966.3	77966.3	79932.9	77866.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,289.92	$ 11,275.99	$ 10,984.11	$ 10,984.11	$ 11,261.14	$ 11,242.63	$ 10,968.92	$ 10,968.92	$ 11,247.19	$ 10,954.82
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	34	52	88	628	35	36	106	646	53	89
Upgrade Package List	Pkg1100101012	Pkg1100101013	Pkg2100101012	Pkg2100111012	Pkg1100101012	Pkg1100101012	Pkg2100101013	Pkg2100111013	Pkg1100101013	Pkg2100101012
GHGI [kg/m2]	0.87	0.87	0.85	0.85	0.87	0.87	0.84	0.84	0.87	0.84
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	57.8	57.5	52.7	52.7	57.7	57.6	52.4	52.4	57.4	52.6
Output: MEUI [kWh/(m2 * yr)]	36.7	36.6	34.6	34.6	36.5	36.4	34.5	34.5	36.4	34.4
Output: Better than ERS (%)	350.0%	360.0%	610.0%	610.0%	380.0%	390.0%	620.0%	620.0%	390.0%	640.0%
Output: Better than Envelope (%)	860.0%	900.0%	1670.0%	1670.0%	870.0%	890.0%	1710.0%	1710.0%	920.0%	1680.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31028	30929	28866	28866	30824	30693	28759	28759	30726	28659
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,374.89	$ 4,361.	$ 4,070.16	$ 4,070.16	$ 4,346.21	$ 4,327.77	$ 4,055.02	$ 4,055.02	$ 4,332.31	$ 4,040.98
Annual savings in carbon tax for electricity [$/year]	$ 15.51	$ 15.46	$ 14.43	$ 14.43	$ 15.41	$ 15.35	$ 14.38	$ 14.38	$ 15.36	$ 14.33
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,390.41	$ 4,376.47	$ 4,084.6	$ 4,084.6	$ 4,361.62	$ 4,343.12	$ 4,069.4	$ 4,069.4	$ 4,347.67	$ 4,055.31
Annual savings in GHG from electricity savings [kg CO2e/year]	341.3	340.2	317.5	317.5	339.1	337.6	316.3	316.3	338	315.3
Annual savings in natural gas [m3/year]	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11
Annual savings in carbon tax for natural gas [$/year]	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3
Net Present Value [$]	$ 3,649.16	$ 3,835.55	$ 1,414.75	$ 1,414.75	$ 3,675.51	$ 3,638.82	$ 1,251.18	$ 1,251.18	$ 3,861.72	$ 1,397.53
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NBC 936 4.67 [RSI]
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 850.	$.	$.	$ 550.	$ 550.

ROWHOUSE Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 21,170.15	$ 21,170.15	$ 21,610.15	$ 21,610.15	$ 21,720.15	$ 21,720.15	$ 22,020.15	$ 22,020.15	$ 22,290.49	$ 22,290.49
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 23,837.59	$ 23,837.59	$ 24,333.03	$ 24,333.03	$ 24,456.89	$ 24,456.89	$ 24,794.69	$ 24,794.69	$ 25,099.09	$ 25,099.09
Net Present Value [$]	$ 40,568.09	$ 40,568.09	$ 40,344.99	$ 40,344.27	$ 40,285.79	$ 40,285.79	$ 40,159.28	$ 40,159.28	$ 40,127.46	$ 40,127.46
Incremental dollars per GHG saving	$ 1.93	$ 1.93	$ 1.96	$ 1.96	$ 1.97	$ 1.97	$ 1.99	$ 1.99	$ 2.01	$ 2.01
Auxiliary Energy Required Heating [GJ/yr]	116.2	116.2	115.3	115.3	116.2	116.2	116.2	116.2	113.5	113.5
Annual Energy DHW [GJ/yr]	84.6	84.6	84.6	84.6	83.4	83.4	82.6	82.6	84.6	84.6
Annual Energy Space Heating [GJ/yr]	123.1	123.1	122.2	122.2	123.1	123.1	123.1	123.1	120.2	120.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	362.9	362.9	362	362	361.8	361.8	361	361	360	360
Design Heating Load [W]	29322.3	29322.3	29177.2	29177.2	29322.3	29322.3	29322.3	29322.3	28907.9	28907.9
Annual Energy Electricity [kWh/yr]	43741.1	43741.1	43736.5	43736.5	43741.2	43741.2	43741.2	43741.2	43726.6	43726.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,126.05	$ 6,126.05	$ 6,125.4	$ 6,125.4	$ 6,126.06	$ 6,126.06	$ 6,126.06	$ 6,126.06	$ 6,124.	$ 6,124.
Annual Energy Natural Gas [m3/yr]	5517.6	5517.6	5493.1	5493.2	5485.6	5485.6	5464.9	5464.9	5440.9	5440.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,380.1	$ 2,380.1	$ 2,369.53	$ 2,369.58	$ 2,366.3	$ 2,366.3	$ 2,357.37	$ 2,357.37	$ 2,347.01	$ 2,347.01
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	184	724	202	742	185	725	186	726	454	994
Upgrade Package List	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033	Pkg2100101032	Pkg2100111032	Pkg2100101032	Pkg2100111032	Pkg2100102032	Pkg2100112032
GHGI [kg/m2]	10.88	10.88	10.83	10.83	10.82	10.82	10.78	10.78	10.73	10.73
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	31.8	31.8	31.6	31.6	31.8	31.8	31.8	31.8	31	31
Output: MEUI [kWh/(m2 * yr)]	57.2	57.2	57	57	56.9	56.9	56.7	56.7	56.4	56.4
Output: Better than ERS (%)	1870.0%	1870.0%	1840.0%	1840.0%	1840.0%	1840.0%	1810.0%	1810.0%	1780.0%	1780.0%
Output: Better than Envelope (%)	4970.0%	4970.0%	5010.0%	5010.0%	4970.0%	4970.0%	4970.0%	4970.0%	5090.0%	5090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5466	5466	5471	5471	5466	5466	5466	5466	5481	5481
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 770.73	$ 770.73	$ 771.38	$ 771.38	$ 770.72	$ 770.72	$ 770.72	$ 770.72	$ 772.78	$ 772.78
Annual savings in carbon tax for electricity [$/year]	$ 2.73	$ 2.73	$ 2.74	$ 2.74	$ 2.73	$ 2.73	$ 2.73	$ 2.73	$ 2.74	$ 2.74
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 773.47	$ 773.47	$ 774.12	$ 774.12	$ 773.45	$ 773.45	$ 773.45	$ 773.45	$ 775.52	$ 775.52
Annual savings in GHG from electricity savings [kg CO2e/year]	60.1	60.1	60.2	60.2	60.1	60.1	60.1	60.1	60.3	60.3
Annual savings in natural gas [m3/year]	212.03	212.03	212.94	212.93	213.22	213.22	213.99	213.99	214.88	214.88
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,964.42	$ 1,964.42	$ 1,972.87	$ 1,972.84	$ 1,975.46	$ 1,975.46	$ 1,982.61	$ 1,982.61	$ 1,990.89	$ 1,990.89
Annual savings in carbon tax for natural gas [$/year]	$ 490.31	$ 490.31	$ 492.42	$ 492.41	$ 493.07	$ 493.07	$ 494.85	$ 494.85	$ 496.92	$ 496.92
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,454.73	$ 2,454.73	$ 2,465.29	$ 2,465.25	$ 2,468.53	$ 2,468.53	$ 2,477.46	$ 2,477.46	$ 2,487.81	$ 2,487.81
Annual savings in GHG from natural gas savings [kg CO2e/year]	10895.8	10895.8	10942.7	10942.5	10957	10957	10996.7	10996.7	11042.6	11042.6
Net Present Value [$]	$ 40,568.09	$ 40,568.09	$ 40,344.99	$ 40,344.27	$ 40,285.79	$ 40,285.79	$ 40,159.28	$ 40,159.28	$ 40,127.46	$ 40,127.46
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.

ROWHOUSE Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 15,418.64	$ 15,418.64	$ 15,968.64	$ 15,968.64	$ 16,268.64	$ 16,268.64	$ 16,538.98	$ 16,538.98	$ 16,778.64	$ 16,778.64
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,361.39	$ 17,361.39	$ 17,980.69	$ 17,980.69	$ 18,318.49	$ 18,318.49	$ 18,622.89	$ 18,622.89	$ 18,892.75	$ 18,892.75
Net Present Value [$]	$ 8,550.4	$ 8,550.22	$ 8,317.78	$ 8,317.6	$ 8,223.79	$ 8,223.61	$ 8,198.93	$ 8,198.93	$ 16,788.84	$ 16,788.84
Incremental dollars per GHG saving	$ .98	$ .98	$ 1.01	$ 1.01	$ 1.02	$ 1.02	$ 1.05	$ 1.05	$ 1.06	$ 1.06
Auxiliary Energy Required Heating [GJ/yr]	184.2	184.2	184.2	184.2	184.2	184.2	181.1	181.1	161.6	161.6
Annual Energy DHW [GJ/yr]	106.7	106.7	105.3	105.3	104.4	104.4	106.7	106.7	106.7	106.7
Annual Energy Space Heating [GJ/yr]	74.7	74.7	74.7	74.7	74.7	74.7	73.6	73.6	66	66
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	1.5	1.5
Total Energy [GJ/yr]	348.1	348.1	346.6	346.6	345.7	345.7	347	347	334.6	334.6
Design Heating Load [W]	34589.3	34589.4	34589.3	34589.4	34589.3	34589.4	34174.9	34174.9	34019.1	34019.1
Annual Energy Electricity [kWh/yr]	67041.1	67041.2	67041.1	67041.2	67041.1	67041.2	66742.5	66742.5	63312.4	63312.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,423.	$ 9,423.01	$ 9,423.	$ 9,423.01	$ 9,423.	$ 9,423.01	$ 9,380.75	$ 9,380.75	$ 8,895.39	$ 8,895.39
Annual Energy Natural Gas [m3/yr]	2865.4	2865.4	2827.5	2827.5	2802.9	2802.9	2865.4	2865.4	2865.5	2865.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,236.03	$ 1,236.03	$ 1,219.68	$ 1,219.68	$ 1,209.07	$ 1,209.07	$ 1,236.03	$ 1,236.03	$ 1,236.08	$ 1,236.08
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64	604	65	605	66	606	334	874	82	622
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100102011	Pkg2100112011	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	6.13	6.13	6.06	6.06	6.01	6.01	6.13	6.13	6.09	6.09
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	50.4	50.4	50.4	50.4	50.4	50.4	49.6	49.6	44.2	44.2
Output: MEUI [kWh/(m2 * yr)]	52.9	52.9	52.5	52.5	52.2	52.2	52.6	52.6	49.2	49.2
Output: Better than ERS (%)	1450.0%	1450.0%	1410.0%	1410.0%	1380.0%	1380.0%	1420.0%	1420.0%	1010.0%	1010.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2030.0%	2030.0%	2030.0%	2030.0%	2160.0%	2160.0%	3010.0%	3010.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity (kWh/yr)	17834	17834	17834	17834	17834	17834	17535	17535	14105	14105
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,514.57	$ 2,514.58	$ 2,514.57	$ 2,514.58	$ 2,514.57	$ 2,514.58	$ 2,472.46	$ 2,472.46	$ 1,988.82	$ 1,988.82
Annual savings in carbon tax for electricity [$/year]	$ 8.92	$ 8.92	$ 8.92	$ 8.92	$ 8.92	$ 8.92	$ 8.77	$ 8.77	$ 7.05	$ 7.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,523.48	$ 2,523.5	$ 2,523.48	$ 2,523.5	$ 2,523.48	$ 2,523.5	$ 2,481.23	$ 2,481.23	$ 1,995.87	$ 1,995.87
Annual savings in GHG from electricity savings [kg CO2e/year]	196.2	196.2	196.2	196.2	196.2	196.2	192.9	192.9	155.2	155.2
Annual savings in natural gas [m3/year]	310.84	310.84	312.26	312.26	313.17	313.17	310.84	310.84	310.84	310.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,879.97	$ 2,879.97	$ 2,893.05	$ 2,893.05	$ 2,901.54	$ 2,901.54	$ 2,879.97	$ 2,879.97	$ 2,879.93	$ 2,879.93
Annual savings in carbon tax for natural gas [$/year]	$ 718.83	$ 718.83	$ 722.09	$ 722.09	$ 724.21	$ 724.21	$ 718.83	$ 718.83	$ 718.82	$ 718.82
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,598.79	$ 3,598.79	$ 3,615.14	$ 3,615.14	$ 3,625.75	$ 3,625.75	$ 3,598.79	$ 3,598.79	$ 3,598.75	$ 3,598.75
Annual savings in GHG from natural gas savings [kg CO2e/year]	15973.9	15973.9	16046.5	16046.5	16093.6	16093.6	15973.9	15973.9	15973.7	15973.7
Net Present Value [$]	$ 8,550.4	$ 8,550.22	$ 8,317.78	$ 8,317.6	$ 8,223.79	$ 8,223.61	$ 8,198.93	$ 8,198.93	$ 16,788.84	$ 16,788.84
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.	$.	$.

ROWHOUSE Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 15,418.64	$ 15,418.64	$ 15,968.64	$ 15,968.64	$ 17,138.98	$ 17,138.98	$ 16,268.64	$ 16,268.64	$ 17,378.64	$ 17,378.64
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 17,361.39	$ 17,361.39	$ 17,980.69	$ 17,980.69	$ 19,298.49	$ 19,298.49	$ 18,318.49	$ 18,318.49	$ 19,568.35	$ 19,568.35
Net Present Value [$]	$ 8,550.4	$ 8,550.22	$ 8,317.78	$ 8,317.6	$ 12,120.79	$ 12,120.79	$ 8,223.79	$ 8,223.61	$ 20,788.17	$ 20,788.17
Incremental dollars per GHG saving	$ .98	$ .98	$ 1.01	$ 1.01	$ 1.01	$ 1.01	$ 1.02	$ 1.02	$ 1.03	$ 1.03
Auxiliary Energy Required Heating [GJ/yr]	184.2	184.2	184.2	184.2	183.5	183.5	184.2	184.2	163.8	163.8
Annual Energy DHW [GJ/yr]	106.7	106.7	105.3	105.3	84.6	84.6	104.4	104.4	84.6	84.6
Annual Energy Space Heating [GJ/yr]	74.7	74.7	74.7	74.7	74.4	74.4	74.7	74.7	66.7	66.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	1.5	1.5
Total Energy [GJ/yr]	348.1	348.1	346.6	346.6	325.5	325.5	345.7	345.7	313	313
Design Heating Load [W]	34589.3	34589.4	34589.3	34589.4	33893.5	33893.5	34589.3	34589.4	33737.6	33737.6
Annual Energy Electricity [kWh/yr]	67041.1	67041.2	67041.1	67041.2	66918.3	66918.3	67041.1	67041.2	63458.5	63458.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,423.	$ 9,423.01	$ 9,423.	$ 9,423.01	$ 9,405.62	$ 9,405.62	$ 9,423.	$ 9,423.01	$ 8,916.06	$ 8,916.06
Annual Energy Natural Gas [m3/yr]	2865.4	2865.4	2827.5	2827.5	2271.5	2271.5	2802.9	2802.9	2271.5	2271.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,236.03	$ 1,236.03	$ 1,219.68	$ 1,219.68	$ 979.85	$ 979.85	$ 1,209.07	$ 1,209.07	$ 979.85	$ 979.85
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64	604	65	605	337	877	66	606	85	625
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100102011	Pkg2100112011	Pkg2100101011	Pkg2100111011	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	6.13	6.13	6.06	6.06	5.01	5.01	6.01	6.01	4.97	4.97
% ICC	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.7%	0.7%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	50.4	50.4	50.4	50.4	50.2	50.2	50.4	50.4	44.8	44.8
Output: MEUI [kWh/(m2 * yr)]	52.9	52.9	52.5	52.5	46.7	46.7	52.2	52.2	43.3	43.3
Output: Better than ERS (%)	1450.0%	1450.0%	1410.0%	1410.0%	890.0%	890.0%	1380.0%	1380.0%	470.0%	470.0%
Output: Better than Envelope (%)	2030.0%	2030.0%	2030.0%	2030.0%	2060.0%	2060.0%	2030.0%	2030.0%	2910.0%	2910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17834	17834	17834	17834	17711	17711	17834	17834	14251	14251
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,514.57	$ 2,514.58	$ 2,514.57	$ 2,514.58	$ 2,497.25	$ 2,497.25	$ 2,514.57	$ 2,514.58	$ 2,009.42	$ 2,009.42
Annual savings in carbon tax for electricity [$/year]	$ 8.92	$ 8.92	$ 8.92	$ 8.92	$ 8.86	$ 8.86	$ 8.92	$ 8.92	$ 7.13	$ 7.13
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,523.48	$ 2,523.5	$ 2,523.48	$ 2,523.5	$ 2,506.11	$ 2,506.11	$ 2,523.48	$ 2,523.5	$ 2,016.54	$ 2,016.54
Annual savings in GHG from electricity savings [kg CO2e/year]	196.2	196.2	196.2	196.2	194.8	194.8	196.2	196.2	156.8	156.8
Annual savings in natural gas [m3/year]	310.84	310.84	312.26	312.26	332.97	332.97	313.17	313.17	332.97	332.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,879.97	$ 2,879.97	$ 2,893.05	$ 2,893.05	$ 3,084.98	$ 3,084.98	$ 2,901.54	$ 2,901.54	$ 3,084.98	$ 3,084.98
Annual savings in carbon tax for natural gas [$/year]	$ 718.83	$ 718.83	$ 722.09	$ 722.09	$ 770.	$ 770.	$ 724.21	$ 724.21	$ 770.	$ 770.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,598.79	$ 3,598.79	$ 3,615.14	$ 3,615.14	$ 3,854.98	$ 3,854.98	$ 3,625.75	$ 3,625.75	$ 3,854.98	$ 3,854.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	15973.9	15973.9	16046.5	16046.5	17111.1	17111.1	16093.6	16093.6	17111.1	17111.1
Net Present Value [$]	$ 8,550.4	$ 8,550.22	$ 8,317.78	$ 8,317.6	$ 12,120.79	$ 12,120.79	$ 8,223.79	$ 8,223.61	$ 20,788.17	$ 20,788.17
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	11.2	11.2	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$.	$.

ROWHOUSE Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,567.91	$ 25,567.91	$ 26,007.91	$ 26,007.91	$ 26,117.91	$ 26,117.91	$ 26,417.91	$ 26,417.91	$ 26,688.25	$ 26,688.25
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 28,789.47	$ 28,789.47	$ 29,284.91	$ 29,284.91	$ 29,408.77	$ 29,408.77	$ 29,746.57	$ 29,746.57	$ 30,050.97	$ 30,050.97
Net Present Value [$]	$ 39,073.2	$ 39,073.2	$ 38,843.19	$ 38,843.19	$ 38,790.96	$ 38,790.96	$ 38,665.18	$ 38,665.18	$ 38,617.59	$ 38,617.59
Incremental dollars per GHG saving	$ 2.21	$ 2.21	$ 2.24	$ 2.24	$ 2.24	$ 2.24	$ 2.26	$ 2.26	$ 2.28	$ 2.28
Auxiliary Energy Required Heating [GJ/yr]	104.5	104.5	103.6	103.6	104.5	104.5	104.5	104.5	101.8	101.8
Annual Energy DHW [GJ/yr]	84.6	84.6	84.6	84.6	83.4	83.4	82.6	82.6	84.6	84.6
Annual Energy Space Heating [GJ/yr]	110.7	110.7	109.8	109.8	110.7	110.7	110.7	110.7	107.8	107.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	350.5	350.5	349.6	349.6	349.3	349.3	348.6	348.6	347.7	347.7
Design Heating Load [W]	27670.2	27670.2	27525	27525	27670.2	27670.2	27670.2	27670.2	27255.8	27255.8
Annual Energy Electricity [kWh/yr]	43679.1	43679.1	43674.6	43674.6	43679.2	43679.2	43679.2	43679.2	43664.9	43664.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,117.28	$ 6,117.28	$ 6,116.64	$ 6,116.64	$ 6,117.29	$ 6,117.29	$ 6,117.29	$ 6,117.29	$ 6,115.27	$ 6,115.27
Annual Energy Natural Gas [m3/yr]	5190.1	5190.1	5166.4	5166.4	5158.1	5158.1	5137.3	5137.3	5115.1	5115.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,238.83	$ 2,238.83	$ 2,228.6	$ 2,228.6	$ 2,225.02	$ 2,225.02	$ 2,216.05	$ 2,216.05	$ 2,206.48	$ 2,206.48
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	3424	3964	3442	3982	3425	3965	3426	3966	3694	4234
Upgrade Package List	Pkg2200101032	Pkg2200111032	Pkg2200101033	Pkg2200111033	Pkg2200101032	Pkg2200111032	Pkg2200101032	Pkg2200111032	Pkg2200102032	Pkg2200112032
GHGI [kg/m2]	10.26	10.26	10.22	10.22	10.2	10.2	10.16	10.16	10.12	10.12
% ICC	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	28.6	28.6	28.4	28.4	28.6	28.6	28.6	28.6	27.9	27.9
Output: MEUI [kWh/(m2 * yr)]	53.8	53.8	53.6	53.6	53.5	53.5	53.3	53.3	53.1	53.1
Output: Better than ERS (%)	1470.0%	1470.0%	1440.0%	1440.0%	1430.0%	1430.0%	1400.0%	1400.0%	1370.0%	1370.0%
Output: Better than Envelope (%)	5480.0%	5480.0%	5520.0%	5520.0%	5480.0%	5480.0%	5480.0%	5480.0%	5590.0%	5590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5528	5528	5533	5533	5528	5528	5528	5528	5542	5542
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 779.48	$ 779.48	$ 780.11	$ 780.11	$ 779.46	$ 779.46	$ 779.46	$ 779.46	$ 781.48	$ 781.48
Annual savings in carbon tax for electricity [$/year]	$ 2.76	$ 2.76	$ 2.77	$ 2.77	$ 2.76	$ 2.76	$ 2.76	$ 2.76	$ 2.77	$ 2.77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 782.24	$ 782.24	$ 782.88	$ 782.88	$ 782.23	$ 782.23	$ 782.23	$ 782.23	$ 784.25	$ 784.25
Annual savings in GHG from electricity savings [kg CO2e/year]	60.8	60.8	60.9	60.9	60.8	60.8	60.8	60.8	61	61
Annual savings in natural gas [m3/year]	224.23	224.23	225.11	225.11	225.42	225.42	226.2	226.2	227.02	227.02
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,077.47	$ 2,077.47	$ 2,085.65	$ 2,085.65	$ 2,088.52	$ 2,088.52	$ 2,095.7	$ 2,095.7	$ 2,103.36	$ 2,103.36
Annual savings in carbon tax for natural gas [$/year]	$ 518.53	$ 518.53	$ 520.57	$ 520.57	$ 521.28	$ 521.28	$ 523.08	$ 523.08	$ 524.99	$ 524.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,596.	$ 2,596.	$ 2,606.22	$ 2,606.22	$ 2,609.8	$ 2,609.8	$ 2,618.77	$ 2,618.77	$ 2,628.35	$ 2,628.35
Annual savings in GHG from natural gas savings [kg CO2e/year]	11522.8	11522.8	11568.2	11568.2	11584.1	11584.1	11623.9	11623.9	11666.4	11666.4
Net Present Value [$]	$ 39,073.2	$ 39,073.2	$ 38,843.19	$ 38,843.19	$ 38,790.96	$ 38,790.96	$ 38,665.18	$ 38,665.18	$ 38,617.59	$ 38,617.59
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA	NBC 936 4.67 [RSI]	NA
Exposed Floor RSI	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$.	$.

ROWHOUSE Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 32,710.11	$ 33,005.58	$ 33,150.11	$ 33,260.11	$ 33,284.64	$ 33,310.11	$ 33,445.58	$ 33,555.58	$ 33,560.11	$ 33,605.58
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 36,831.58	$ 37,164.28	$ 37,327.02	$ 37,450.88	$ 37,478.5	$ 37,507.18	$ 37,659.72	$ 37,783.58	$ 37,788.68	$ 37,839.88
Net Present Value [$]	$ 16,611.17	$ 16,851.77	$ 16,410.72	$ 16,378.55	$ 16,863.2	$ 20,654.5	$ 16,642.19	$ 16,619.15	$ 16,284.56	$ 20,889.26
Incremental dollars per GHG saving	$ 2.06	$ 2.08	$ 2.09	$ 2.08	$ 2.1	$ 1.96	$ 2.11	$ 2.1	$ 2.1	$ 1.97
Auxiliary Energy Required Heating [GJ/yr]	98.3	96.4	97.5	98.3	95.4	100.2	95.6	96.4	98.3	98.3
Annual Energy DHW [GJ/yr]	106.7	106.7	106.7	105.3	106.7	84.6	106.7	105.3	104.4	84.6
Annual Energy Space Heating [GJ/yr]	41.7	41	41.4	41.7	40.6	42.3	40.7	41	41.7	41.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	312.6	311.9	312.3	311.2	311.5	290.9	311.5	310.4	310.3	290.2
Design Heating Load [W]	27364.6	27050.1	27219.4	27364.6	26881.1	27117.7	26905	27050.1	27364.6	26803.3
Annual Energy Electricity [kWh/yr]	57192.8	56984.6	57099.8	57192.8	56871.8	57322.1	56895.1	56984.6	57192.8	57116.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,029.47	$ 8,000.01	$ 8,016.31	$ 8,029.47	$ 7,984.04	$ 8,047.76	$ 7,987.34	$ 8,000.01	$ 8,029.47	$ 8,018.63
Annual Energy Natural Gas [m3/yr]	2865.6	2865.6	2865.6	2827.7	2865.6	2271.5	2865.6	2827.7	2803.1	2271.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,236.12	$ 1,236.12	$ 1,236.12	$ 1,219.77	$ 1,236.12	$ 979.85	$ 1,236.12	$ 1,219.77	$ 1,209.16	$ 979.85
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	17776	18424	17794	17777	19072	17779	18442	18425	17778	18427
Upgrade Package List	Pkg3200211032	Pkg3200221032	Pkg3200211033	Pkg3200211032	Pkg3200231032	Pkg3200211032	Pkg3200221033	Pkg3200221032	Pkg3200211032	Pkg3200221032
GHGI [kg/m2]	6.02	6.02	6.02	5.95	6.02	4.9	6.02	5.95	5.91	4.9
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	26.9	26.4	26.7	26.9	26.1	27.4	26.2	26.4	26.9	26.9
Output: MEUI [kWh/(m2 * yr)]	43.1	42.9	43	42.7	42.8	37.1	42.8	42.5	42.4	36.9
Output: Better than ERS (%)	290.0%	260.0%	280.0%	240.0%	250.0%	270.0%	250.0%	210.0%	210.0%	290.0%
Output: Better than Envelope (%)	5750.0%	5830.0%	5780.0%	5750.0%	5870.0%	5660.0%	5860.0%	5830.0%	5750.0%	5750.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7986	7777	7892	7986	7664	8115	7688	7777	7986	7909
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,125.96	$ 1,096.6	$ 1,112.84	$ 1,125.96	$ 1,080.69	$ 1,144.19	$ 1,083.98	$ 1,096.6	$ 1,125.96	$ 1,115.15
Annual savings in carbon tax for electricity [$/year]	$ 3.99	$ 3.89	$ 3.95	$ 3.99	$ 3.83	$ 4.06	$ 3.84	$ 3.89	$ 3.99	$ 3.95
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,129.95	$ 1,100.49	$ 1,116.79	$ 1,129.95	$ 1,084.53	$ 1,148.24	$ 1,087.82	$ 1,100.49	$ 1,129.95	$ 1,119.11
Annual savings in GHG from electricity savings [kg CO2e/year]	87.8	85.6	86.8	87.8	84.3	89.3	84.6	85.6	87.8	87
Annual savings in natural gas [m3/year]	310.84	310.84	310.84	312.25	310.84	332.97	310.84	312.25	313.16	332.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,879.9	$ 2,879.9	$ 2,879.9	$ 2,892.98	$ 2,879.9	$ 3,084.98	$ 2,879.9	$ 2,892.98	$ 2,901.47	$ 3,084.98
Annual savings in carbon tax for natural gas [$/year]	$ 718.81	$ 718.81	$ 718.81	$ 722.07	$ 718.81	$ 770.	$ 718.81	$ 722.07	$ 724.19	$ 770.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,598.71	$ 3,598.71	$ 3,598.71	$ 3,615.06	$ 3,598.71	$ 3,854.98	$ 3,598.71	$ 3,615.06	$ 3,625.67	$ 3,854.98
Annual savings in GHG from natural gas savings [kg CO2e/year]	15973.5	15973.5	15973.5	16046.1	15973.5	17111.1	15973.5	16046.1	16093.2	17111.1
Net Present Value [$]	$ 16,611.17	$ 16,851.77	$ 16,410.72	$ 16,378.55	$ 16,863.2	$ 20,654.5	$ 16,642.19	$ 16,619.15	$ 16,284.56	$ 20,889.26
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	NA	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	4.67	5.64	5.64	4.67	5.64
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$.	$ 295.47	$ 295.47	$.	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.	$.

ROWHOUSE Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 37,015.95	$ 37,311.42	$ 37,455.95	$ 37,513.69	$ 37,565.95	$ 37,590.48	$ 37,623.69	$ 37,626.94	$ 37,725.66	$ 37,751.42
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 41,679.96	$ 42,012.66	$ 42,175.4	$ 42,240.41	$ 42,299.26	$ 42,326.88	$ 42,364.27	$ 42,367.93	$ 42,479.09	$ 42,508.1
Net Present Value [$]	$ 2,091.5	$ 2,358.94	$ 1,898.18	$ 1,582.99	$ 2,057.85	$ 2,385.9	$ 1,743.95	$ 1,403.46	$ 1,276.63	$ 2,161.05
Incremental dollars per GHG saving	$ 1.74	$ 1.76	$ 1.77	$ 1.77	$ 1.77	$ 1.77	$ 1.77	$ 1.77	$ 1.78	$ 1.78
Auxiliary Energy Required Heating [GJ/yr]	115.5	113.5	114.7	115	115.2	112.4	115.5	114.9	115.2	112.6
Annual Energy DHW [GJ/yr]	43.5	43.5	43.5	43.5	42.9	43.5	42.9	43.5	43.5	43.5
Annual Energy Space Heating [GJ/yr]	47.7	46.9	47.4	47.6	47.6	46.5	47.9	47.7	47.7	46.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	253.7	253	253.4	253.8	253	252.5	253.4	253.8	253.9	252.6
Design Heating Load [W]	26228.7	25914.3	26083.6	26164.4	26228.7	25745.2	26309.5	26328.8	26397.8	25769.1
Annual Energy Electricity [kWh/yr]	70483.7	70265	70387.9	70487.9	70283.1	70146.2	70382.6	70513.6	70524.5	70171
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,910.13	$ 9,879.18	$ 9,896.57	$ 9,910.72	$ 9,881.74	$ 9,862.37	$ 9,895.82	$ 9,914.36	$ 9,915.9	$ 9,865.88
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	23614	24262	23632	21256	23615	24910	21239	22534	23002	24280
Upgrade Package List	Pkg3300211032	Pkg3300211032	Pkg3300211033	Pkg3200332033	Pkg3300211032	Pkg3300231032	Pkg3200332032	Pkg3200422032	Pkg3200431034	Pkg3300221033
GHGI [kg/m2]	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	31.6	31.1	31.4	31.5	31.5	30.8	31.6	31.4	31.5	30.8
Output: MEUI [kWh/(m2 * yr)]	27	26.8	26.9	27	26.8	26.7	26.9	27.1	27.1	26.7
Output: Better than ERS (%)	1530.0%	1550.0%	1540.0%	1520.0%	1550.0%	1570.0%	1540.0%	1520.0%	1520.0%	1560.0%
Output: Better than Envelope (%)	5000.0%	5090.0%	5040.0%	5020.0%	5020.0%	5140.0%	5000.0%	5030.0%	5020.0%	5130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	21276	21058	21181	21281	21076	20939	21175	21306	21317	20964
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,999.97	$ 2,969.14	$ 2,986.46	$ 3,000.56	$ 2,971.69	$ 2,952.38	$ 2,985.72	$ 3,004.19	$ 3,005.73	$ 2,955.88
Annual savings in carbon tax for electricity [$/year]	$ 10.64	$ 10.53	$ 10.59	$ 10.64	$ 10.54	$ 10.47	$ 10.59	$ 10.65	$ 10.66	$ 10.48
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,010.61	$ 2,979.66	$ 2,997.05	$ 3,011.2	$ 2,982.23	$ 2,962.85	$ 2,996.3	$ 3,014.84	$ 3,016.38	$ 2,966.36
Annual savings in GHG from electricity savings [kg CO2e/year]	234	231.6	233	234.1	231.8	230.3	232.9	234.4	234.5	230.6
Annual savings in natural gas [m3/year]	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61	417.61
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11	$ 3,869.11
Annual savings in carbon tax for natural gas [$/year]	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71	$ 965.71
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83	$ 4,834.83
Annual savings in GHG from natural gas savings [kg CO2e/year]	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3	21460.3
Net Present Value [$]	$ 2,091.5	$ 2,358.94	$ 1,898.18	$ 1,582.99	$ 2,057.85	$ 2,385.9	$ 1,743.95	$ 1,403.46	$ 1,276.63	$ 2,161.05
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	11.2	9.02	9.02	11.2	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	7.04	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 13,865.16	$ 16,797.	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 5,386.91	$ 4,092.2	$ 4,092.2	$ 5,386.91	$ 6,219.22	$ 6,219.22	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	BC ExpFloor R36	NA	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32
Exposed Floor RSI	4.67	5.64	4.67	6.34	4.67	6.34	6.34	5.64	6.34	5.64
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$ 574.53	$.	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	DWHR eff 30	elec heatpump ef1.90	elec heatpump ef1.90	DWHR eff 30	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$.	$.

ROWHOUSE Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 33,884.64	$ 33,605.58	$ 34,324.64	$ 34,045.58	$ 33,310.11	$ 34,434.64	$ 34,155.58	$ 35,004.98	$ 34,734.64	$ 34,455.58
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 38,154.1	$ 37,839.88	$ 38,649.54	$ 38,335.32	$ 37,507.18	$ 38,773.4	$ 38,459.18	$ 39,415.61	$ 39,111.2	$ 38,796.98
Net Present Value [$]	$ 20,899.41	$ 20,889.26	$ 20,689.84	$ 20,678.59	$ 20,654.5	$ 20,618.2	$ 20,607.86	$ 20,492.98	$ 20,492.29	$ 20,481.77
Incremental dollars per GHG saving	$ 1.99	$ 1.97	$ 2.02	$ 2.	$ 1.96	$ 2.02	$ 2.	$ 2.06	$ 2.03	$ 2.01
Auxiliary Energy Required Heating [GJ/yr]	97.3	98.3	96.4	97.5	100.2	97.3	98.3	94.6	97.3	98.3
Annual Energy DHW [GJ/yr]	84.6	84.6	84.6	84.6	84.6	83.4	83.4	84.6	82.6	82.6
Annual Energy Space Heating [GJ/yr]	41.2	41.6	40.9	41.3	42.3	41.2	41.6	40.2	41.2	41.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	289.8	290.2	289.5	288.9	290.9	288.6	289	288.8	287.8	288.2
Design Heating Load [W]	26634.2	26803.3	26489	26658.1	27117.7	26634.2	26803.3	26219.8	26634.2	26803.3
Annual Energy Electricity [kWh/yr]	57003.8	57116.2	56914.3	57027.1	57322.1	57004.9	57117.3	56726.5	57005.6	57118.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,002.72	$ 8,018.63	$ 7,990.06	$ 8,006.02	$ 8,047.76	$ 8,002.88	$ 8,018.78	$ 7,963.48	$ 8,002.98	$ 8,018.9
Annual Energy Natural Gas [m3/yr]	2271.5	2271.5	2271.5	2271.5	2271.5	2239.1	2239.1	2271.5	2218.1	2218.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 979.85	$ 979.85	$ 979.85	$ 979.85	$ 979.85	$ 965.87	$ 965.87	$ 979.85	$ 956.81	$ 956.81
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	19075	18427	19093	18445	17779	19076	18428	19291	19077	18429
Upgrade Package List	Pkg3200231032	Pkg3200221032	Pkg3200231033	Pkg3200221033	Pkg3200211032	Pkg3200231032	Pkg3200221032	Pkg3200232032	Pkg3200231032	Pkg3200221032
GHGI [kg/m2]	4.9	4.9	4.9	4.9	4.9	4.84	4.84	4.9	4.8	4.8
% ICC	1.5%	1.5%	1.6%	1.5%	1.5%	1.6%	1.5%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	26.6	26.9	26.4	26.7	27.4	26.6	26.9	25.9	26.6	26.9
Output: MEUI [kWh/(m2 * yr)]	36.8	36.9	36.7	36.9	37.1	36.5	36.6	36.6	36.3	36.4
Output: Better than ERS (%)	300.0%	290.0%	310.0%	300.0%	270.0%	340.0%	330.0%	340.0%	370.0%	360.0%
Output: Better than Envelope (%)	5790.0%	5750.0%	5830.0%	5780.0%	5660.0%	5790.0%	5750.0%	5910.0%	5790.0%	5750.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	7796	7909	7707	7820	8115	7798	7910	7519	7798	7911
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,099.31	$ 1,115.15	$ 1,086.69	$ 1,102.59	$ 1,144.19	$ 1,099.46	$ 1,115.31	$ 1,060.21	$ 1,099.56	$ 1,115.42
Annual savings in carbon tax for electricity [$/year]	$ 3.9	$ 3.95	$ 3.85	$ 3.91	$ 4.06	$ 3.9	$ 3.96	$ 3.76	$ 3.9	$ 3.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,103.2	$ 1,119.11	$ 1,090.54	$ 1,106.5	$ 1,148.24	$ 1,103.36	$ 1,119.26	$ 1,063.97	$ 1,103.46	$ 1,119.38
Annual savings in GHG from electricity savings [kg CO2e/year]	85.8	87	84.8	86	89.3	85.8	87	82.7	85.8	87
Annual savings in natural gas [m3/year]	332.97	332.97	332.97	332.97	332.97	334.18	334.18	332.97	334.96	334.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,084.98	$ 3,084.98	$ 3,084.98	$ 3,084.98	$ 3,084.98	$ 3,096.17	$ 3,096.17	$ 3,084.98	$ 3,103.42	$ 3,103.42
Annual savings in carbon tax for natural gas [$/year]	$ 770.	$ 770.	$ 770.	$ 770.	$ 770.	$ 772.79	$ 772.79	$ 770.	$ 774.6	$ 774.6
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,854.98	$ 3,854.98	$ 3,854.98	$ 3,854.98	$ 3,854.98	$ 3,868.96	$ 3,868.96	$ 3,854.98	$ 3,878.02	$ 3,878.02
Annual savings in GHG from natural gas savings [kg CO2e/year]	17111.1	17111.1	17111.1	17111.1	17111.1	17173.1	17173.1	17111.1	17213.3	17213.3
Net Present Value [$]	$ 20,899.41	$ 20,889.26	$ 20,689.84	$ 20,678.59	$ 20,654.5	$ 20,618.2	$ 20,607.86	$ 20,492.98	$ 20,492.29	$ 20,481.77
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	NA	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32
Exposed Floor RSI	6.34	5.64	6.34	5.64	4.67	6.34	5.64	6.34	6.34	5.64
Exposed Floor Cost of Upgrade	$ 574.53	$ 295.47	$ 574.53	$ 295.47	$.	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.

ROWHOUSE Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 14,228.64	$ 14,228.64	$ 14,668.64	$ 14,668.64	$ 14,778.64	$ 14,778.64	$ 14,918.64	$ 15,002.64	$ 15,002.64	$ 15,078.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 21,371.42	$ 21,371.42	$ 22,032.3	$ 22,032.3	$ 22,197.52	$ 22,197.52	$ 22,407.8	$ 22,533.97	$ 22,533.97	$ 22,648.12
Net Present Value [$]	$ 48,108.19	$ 47,837.71	$ 47,963.12	$ 47,691.31	$ 47,879.58	$ 47,609.1	$ 10,799.34	$ 25,908.3	$ 25,628.48	$ 47,791.22
Incremental dollars per GHG saving	$ 1.28	$ 1.29	$ 1.32	$ 1.32	$ 1.32	$ 1.33	$ .68	$ 1.08	$ 1.09	$ 1.35
Auxiliary Energy Required Heating [GJ/yr]	231.2	232.3	230	231.1	231.2	232.3	287.3	265	266.1	231.3
Annual Energy DHW [GJ/yr]	91.9	91.9	91.9	91.9	90.4	90.4	115.2	47.2	47.2	89.4
Annual Energy Space Heating [GJ/yr]	244.9	246.1	243.6	244.8	244.9	246.1	146.9	280.6	281.8	244.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	6.2	1.5	1.5	1.5
Total Energy [GJ/yr]	492	493.2	490.8	491.9	490.6	491.7	424.6	483.1	484.3	489.6
Design Heating Load [W]	39671.8	39824	39499.4	39651.6	39671.8	39824	48315.4	40023.5	40175.7	39671.8
Annual Energy Electricity [kWh/yr]	44348.9	44354.7	44342.7	44348.4	44349	44354.8	85933.9	57632.1	57638.1	44349.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,212.05	$ 6,212.88	$ 6,211.18	$ 6,211.98	$ 6,212.07	$ 6,212.89	$ 12,096.33	$ 8,091.63	$ 8,092.48	$ 6,212.08
Annual Energy Natural Gas [m3/yr]	8924.9	8955.4	8891.6	8922.3	8886.5	8917	3094	7400.2	7431.8	8861.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,849.89	$ 3,863.05	$ 3,835.53	$ 3,848.77	$ 3,833.33	$ 3,846.48	$ 1,334.64	$ 3,192.19	$ 3,205.82	$ 3,822.41
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32962	33502	32980	33520	32963	33503	32896	32965	33505	32964
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg1100101011	Pkg2100101012	Pkg2100111012	Pkg2100101012
GHGI [kg/m2]	17.31	17.37	17.25	17.3	17.24	17.3	6.77	14.58	14.64	17.19
% ICC	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	63.3	63.6	62.9	63.2	63.3	63.6	78.6	72.5	72.8	63.3
Output: MEUI [kWh/(m2 * yr)]	92.5	92.9	92.2	92.5	92.2	92.5	74	90.1	90.4	91.9
Output: Better than ERS (%)	2300.0%	2330.0%	2270.0%	2300.0%	2270.0%	2290.0%	910.0%	2040.0%	2070.0%	2240.0%
Output: Better than Envelope (%)	2560.0%	2520.0%	2600.0%	2560.0%	2560.0%	2520.0%	750.0%	1470.0%	1440.0%	2560.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5472	5466	5478	5472	5472	5466	36113	7812	7818	5471
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 771.5	$ 770.68	$ 772.37	$ 771.57	$ 771.48	$ 770.66	$ 5,091.99	$ 1,101.44	$ 1,102.28	$ 771.47
Annual savings in carbon tax for electricity [$/year]	$ 2.74	$ 2.73	$ 2.74	$ 2.74	$ 2.74	$ 2.73	$ 18.06	$ 3.91	$ 3.91	$ 2.74
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 774.23	$ 773.41	$ 775.11	$ 774.3	$ 774.22	$ 773.4	$ 5,110.05	$ 1,105.34	$ 1,106.19	$ 774.2
Annual savings in GHG from electricity savings [kg CO2e/year]	60.2	60.1	60.3	60.2	60.2	60.1	397.2	85.9	86	60.2
Annual savings in natural gas [m3/year]	214.63	213.49	215.87	214.72	216.06	214.92	431.88	271.43	270.26	217
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 1,988.51	$ 1,977.98	$ 2,000.01	$ 1,989.41	$ 2,001.77	$ 1,991.24	$ 4,001.36	$ 2,514.84	$ 2,503.94	$ 2,010.5
Annual savings in carbon tax for natural gas [$/year]	$ 496.32	$ 493.7	$ 499.19	$ 496.55	$ 499.63	$ 497.	$ 998.72	$ 627.69	$ 624.97	$ 501.81
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,484.84	$ 2,471.68	$ 2,499.2	$ 2,485.96	$ 2,501.4	$ 2,488.24	$ 5,000.08	$ 3,142.54	$ 3,128.91	$ 2,512.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	11029.4	10971	11093.2	11034.4	11102.9	11044.5	22193.8	13948.7	13888.2	11151.4
Net Present Value [$]	$ 48,108.19	$ 47,837.71	$ 47,963.12	$ 47,691.31	$ 47,879.58	$ 47,609.1	$ 10,799.34	$ 25,908.3	$ 25,628.48	$ 47,791.22
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	5.02	4.67	5.02
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	NA	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 3,150.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 1,374.	$ 1,374.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$.	$ 850.

ROWHOUSE Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 16,792.64	$ 16,792.64	$ 17,342.64	$ 17,342.64	$ 17,652.64	$ 17,642.64	$ 17,642.64	$ 17,912.98	$ 17,912.98	$ 18,092.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,222.55	$ 25,222.55	$ 26,048.65	$ 26,048.65	$ 26,514.27	$ 26,499.25	$ 26,499.25	$ 26,905.3	$ 26,905.3	$ 27,175.15
Net Present Value [$]	$ 19,110.62	$ 19,496.61	$ 18,990.17	$ 19,376.34	$ 17,973.69	$ 18,846.67	$ 19,232.66	$ 19,107.52	$ 19,462.46	$ 18,011.46
Incremental dollars per GHG saving	$ .61	$ .61	$ .63	$ .63	$ .64	$ .64	$ .64	$ .65	$ .65	$ .66
Auxiliary Energy Required Heating [GJ/yr]	294.2	295.3	293.6	294.8	294.9	293.3	294.4	290.1	291.2	293.6
Annual Energy DHW [GJ/yr]	47.2	47.2	46.4	46.4	47.2	46	46	47.2	47.2	47.2
Annual Energy Space Heating [GJ/yr]	145.7	146.3	145.5	146.1	147.8	145.4	145.9	144.2	144.7	147.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	1.5	6.2	6.2	6.2	6.2	1.5
Total Energy [GJ/yr]	354.6	355.1	353.7	354.2	351.8	353	353.6	353	353.5	351.2
Design Heating Load [W]	42294.6	42446.8	42294.6	42446.8	47638.2	42294.6	42446.8	41802.5	41954.7	47465.8
Annual Energy Electricity [kWh/yr]	98501	98650.9	98240.6	98390.6	97725.3	98068.3	98218.2	98064.6	98202.5	97569.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,874.58	$ 13,895.79	$ 13,837.73	$ 13,858.95	$ 13,764.81	$ 13,813.35	$ 13,834.56	$ 13,812.83	$ 13,832.34	$ 13,742.71
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32956	33496	32957	33497	32920	32958	33498	33226	33766	32938
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg1100101012	Pkg2100101011	Pkg2100111011	Pkg2100102011	Pkg2100112011	Pkg1100101013
GHGI [kg/m2]	1.07	1.07	1.06	1.07	1.06	1.06	1.06	1.06	1.06	1.06
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	80.5	80.8	80.3	80.6	80.7	80.2	80.5	79.4	79.7	80.3
Output: MEUI [kWh/(m2 * yr)]	54.9	55	54.6	54.8	54.1	54.5	54.6	54.4	54.6	54
Output: Better than ERS (%)	790.0%	780.0%	820.0%	800.0%	870.0%	840.0%	820.0%	840.0%	820.0%	880.0%
Output: Better than Envelope (%)	530.0%	500.0%	550.0%	510.0%	510.0%	560.0%	520.0%	660.0%	630.0%	550.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	48680	48830	48420	48570	47905	48248	48398	48244	48382	47749
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,863.95	$ 6,885.09	$ 6,827.23	$ 6,848.38	$ 6,754.58	$ 6,802.94	$ 6,824.08	$ 6,802.42	$ 6,821.86	$ 6,732.55
Annual savings in carbon tax for electricity [$/year]	$ 24.34	$ 24.42	$ 24.21	$ 24.29	$ 23.95	$ 24.12	$ 24.2	$ 24.12	$ 24.19	$ 23.87
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,888.29	$ 6,909.5	$ 6,851.44	$ 6,872.67	$ 6,778.53	$ 6,827.06	$ 6,848.27	$ 6,826.54	$ 6,846.05	$ 6,756.43
Annual savings in GHG from electricity savings [kg CO2e/year]	535.5	537.1	532.6	534.3	527	530.7	532.4	530.7	532.2	525.2
Annual savings in natural gas [m3/year]	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42
Annual savings in carbon tax for natural gas [$/year]	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73
Annual savings in GHG from natural gas savings [kg CO2e/year]	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9
Net Present Value [$]	$ 19,110.62	$ 19,496.61	$ 18,990.17	$ 19,376.34	$ 17,973.69	$ 18,846.67	$ 19,232.66	$ 19,107.52	$ 19,462.46	$ 18,011.46
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	5.02	4.67	5.02	4.67	5.02
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	HRV sre 60	NA	NA	NA	NA	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55	DWHR eff 55	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$ 1,360.	$.	$.	$.	$.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$ 550.	$ 550.	$.	$ 850.	$ 850.	$.	$.	$.

ROWHOUSE Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 21,170.15	$ 21,610.15	$ 22,290.49	$ 21,720.15	$ 21,170.15	$ 22,020.15	$ 22,730.49	$ 22,160.15	$ 21,610.15	$ 22,840.49
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,797.57	$ 32,458.45	$ 33,480.32	$ 32,623.67	$ 31,797.57	$ 33,074.27	$ 34,141.2	$ 33,284.55	$ 32,458.45	$ 34,306.42
Net Present Value [$]	$ 55,703.38	$ 55,533.13	$ 55,482.94	$ 55,475.13	$ 55,454.32	$ 55,387.56	$ 55,311.35	$ 55,304.27	$ 55,284.07	$ 55,254.5
Incremental dollars per GHG saving	$ 1.49	$ 1.51	$ 1.55	$ 1.52	$ 1.49	$ 1.53	$ 1.57	$ 1.54	$ 1.52	$ 1.58
Auxiliary Energy Required Heating [GJ/yr]	172.5	171.4	168.9	172.5	173.5	172.5	167.8	171.4	172.4	168.9
Annual Energy DHW [GJ/yr]	91.9	91.9	91.9	90.4	91.9	89.4	91.9	90.4	91.9	90.4
Annual Energy Space Heating [GJ/yr]	182.7	181.6	178.9	182.7	183.8	182.7	177.7	181.6	182.6	178.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	429.8	428.7	426	428.4	430.9	427.4	424.8	427.2	429.7	424.5
Design Heating Load [W]	35733.2	35560.8	35241	35733.2	35885.4	35733.2	35068.7	35560.8	35713	35241
Annual Energy Electricity [kWh/yr]	44038.6	44032.8	44019.3	44038.6	44043.9	44038.7	44013.6	44032.9	44038.1	44019.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,168.15	$ 6,167.33	$ 6,165.42	$ 6,168.15	$ 6,168.9	$ 6,168.16	$ 6,164.61	$ 6,167.34	$ 6,168.08	$ 6,165.43
Annual Energy Natural Gas [m3/yr]	7284.8	7254.4	7183.3	7246.4	7312.9	7221	7153	7216	7282.5	7144.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,142.41	$ 3,129.3	$ 3,098.63	$ 3,125.84	$ 3,154.53	$ 3,114.89	$ 3,085.55	$ 3,112.73	$ 3,141.42	$ 3,082.06
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	33070	33088	33340	33071	33610	33072	33358	33089	33628	33341
Upgrade Package List	Pkg2100101032	Pkg2100101033	Pkg2100102032	Pkg2100101032	Pkg2100111032	Pkg2100101032	Pkg2100102033	Pkg2100101033	Pkg2100111033	Pkg2100102032
GHGI [kg/m2]	14.21	14.16	14.02	14.14	14.27	14.09	13.97	14.08	14.21	13.95
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	47.2	46.9	46.2	47.2	47.5	47.2	45.9	46.9	47.2	46.2
Output: MEUI [kWh/(m2 * yr)]	75.5	75.2	74.5	75.1	75.8	74.9	74.2	74.8	75.5	74.1
Output: Better than ERS (%)	750.0%	720.0%	650.0%	710.0%	770.0%	680.0%	620.0%	680.0%	740.0%	610.0%
Output: Better than Envelope (%)	4450.0%	4480.0%	4560.0%	4450.0%	4420.0%	4450.0%	4600.0%	4480.0%	4450.0%	4560.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5782	5788	5801	5782	5777	5782	5807	5788	5782	5801
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 815.25	$ 816.07	$ 817.97	$ 815.25	$ 814.5	$ 815.23	$ 818.77	$ 816.05	$ 815.32	$ 817.96
Annual savings in carbon tax for electricity [$/year]	$ 2.89	$ 2.89	$ 2.9	$ 2.89	$ 2.89	$ 2.89	$ 2.9	$ 2.89	$ 2.89	$ 2.9
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 818.14	$ 818.96	$ 820.87	$ 818.14	$ 817.39	$ 818.12	$ 821.68	$ 818.95	$ 818.21	$ 820.86
Annual savings in GHG from electricity savings [kg CO2e/year]	63.6	63.7	63.8	63.6	63.5	63.6	63.9	63.7	63.6	63.8
Annual savings in natural gas [m3/year]	275.73	276.87	279.52	277.17	274.69	278.11	280.65	278.3	275.82	280.95
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,554.68	$ 2,565.18	$ 2,589.72	$ 2,567.94	$ 2,544.98	$ 2,576.71	$ 2,600.18	$ 2,578.43	$ 2,555.48	$ 2,602.98
Annual savings in carbon tax for natural gas [$/year]	$ 637.64	$ 640.26	$ 646.38	$ 640.94	$ 635.22	$ 643.13	$ 648.99	$ 643.56	$ 637.83	$ 649.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,192.32	$ 3,205.43	$ 3,236.1	$ 3,208.88	$ 3,180.2	$ 3,219.84	$ 3,249.17	$ 3,222.	$ 3,193.31	$ 3,252.67
Annual savings in GHG from natural gas savings [kg CO2e/year]	14169.7	14227.9	14364	14243.2	14115.9	14291.9	14422.1	14301.4	14174.1	14437.6
Net Present Value [$]	$ 55,703.38	$ 55,533.13	$ 55,482.94	$ 55,475.13	$ 55,454.32	$ 55,387.56	$ 55,311.35	$ 55,304.27	$ 55,284.07	$ 55,254.5
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	11.2	9.02	9.02	9.02	11.2	9.02	9.02	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	5.02	5.02	5.02	5.02	4.67	5.02	5.02	5.02	4.67	5.02
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 850.	$.	$ 550.	$.	$ 550.

ROWHOUSE Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 16,778.64	$ 16,778.64	$ 17,218.64	$ 17,218.64	$ 17,328.64	$ 17,328.64	$ 17,378.64	$ 17,378.64	$ 17,628.64	$ 17,628.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 25,201.52	$ 25,201.52	$ 25,862.4	$ 25,862.4	$ 26,027.62	$ 26,027.62	$ 26,102.72	$ 26,102.72	$ 26,478.22	$ 26,478.22
Net Present Value [$]	$ 11,379.07	$ 11,018.83	$ 11,321.59	$ 10,961.71	$ 11,210.27	$ 10,850.03	$ 15,796.45	$ 15,431.28	$ 11,162.38	$ 10,802.14
Incremental dollars per GHG saving	$ .77	$ .77	$ .79	$ .79	$ .79	$ .79	$ .75	$ .75	$ .8	$ .8
Auxiliary Energy Required Heating [GJ/yr]	229.6	230.7	228.4	229.5	229.6	230.7	231.2	232.3	229.6	230.7
Annual Energy DHW [GJ/yr]	115.2	115.2	115.2	115.2	113.5	113.5	91.9	91.9	112.4	112.4
Annual Energy Space Heating [GJ/yr]	118.1	118.6	117.5	118	118.1	118.6	118.4	119	118.1	118.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	391	391.5	390.4	390.9	389.3	389.8	367.9	368.4	388.2	388.7
Design Heating Load [W]	41617.4	41769.6	41445.1	41597.3	41617.4	41769.6	41200.4	41352.6	41617.4	41769.6
Annual Energy Electricity [kWh/yr]	76596.6	76736.5	76448	76587.8	76596.6	76736.5	76689.4	76831.2	76596.6	76736.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,775.1	$ 10,794.9	$ 10,754.08	$ 10,773.86	$ 10,775.1	$ 10,794.9	$ 10,788.24	$ 10,808.3	$ 10,775.1	$ 10,794.9
Annual Energy Natural Gas [m3/yr]	3094	3094	3094	3094	3048.5	3048.5	2466.5	2466.5	3018.4	3018.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,334.64	$ 1,334.64	$ 1,334.64	$ 1,334.64	$ 1,315.02	$ 1,315.02	$ 1,063.96	$ 1,063.96	$ 1,302.03	$ 1,302.03
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	32968	33508	32986	33526	32969	33509	32971	33511	32970	33510
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	6.66	6.67	6.66	6.66	6.58	6.58	5.48	5.48	6.52	6.52
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	62.8	63.1	62.5	62.8	62.8	63.1	63.3	63.6	62.8	63.1
Output: MEUI [kWh/(m2 * yr)]	64.8	64.9	64.7	64.8	64.3	64.5	58.5	58.6	64	64.2
Output: Better than ERS (%)	40.0%	60.0%	30.0%	40.0%	0.0%	10.0%	420.0%	410.0%	30.0%	20.0%
Output: Better than Envelope (%)	2610.0%	2570.0%	2650.0%	2610.0%	2610.0%	2570.0%	2560.0%	2520.0%	2610.0%	2570.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26776	26916	26628	26767	26776	26916	26869	27011	26776	26916
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,775.43	$ 3,795.16	$ 3,754.48	$ 3,774.19	$ 3,775.43	$ 3,795.16	$ 3,788.51	$ 3,808.51	$ 3,775.43	$ 3,795.16
Annual savings in carbon tax for electricity [$/year]	$ 13.39	$ 13.46	$ 13.31	$ 13.38	$ 13.39	$ 13.46	$ 13.43	$ 13.51	$ 13.39	$ 13.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,788.82	$ 3,808.61	$ 3,767.79	$ 3,787.57	$ 3,788.82	$ 3,808.61	$ 3,801.95	$ 3,822.01	$ 3,788.82	$ 3,808.61
Annual savings in GHG from electricity savings [kg CO2e/year]	294.5	296.1	292.9	294.4	294.5	296.1	295.6	297.1	294.5	296.1
Annual savings in natural gas [m3/year]	431.88	431.88	431.88	431.88	433.57	433.57	455.26	455.26	434.7	434.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,001.36	$ 4,001.36	$ 4,001.36	$ 4,001.36	$ 4,017.07	$ 4,017.07	$ 4,217.98	$ 4,217.98	$ 4,027.46	$ 4,027.46
Annual savings in carbon tax for natural gas [$/year]	$ 998.72	$ 998.72	$ 998.72	$ 998.72	$ 1,002.64	$ 1,002.64	$ 1,052.79	$ 1,052.79	$ 1,005.23	$ 1,005.23
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,000.08	$ 5,000.08	$ 5,000.08	$ 5,000.08	$ 5,019.71	$ 5,019.71	$ 5,270.76	$ 5,270.76	$ 5,032.69	$ 5,032.69
Annual savings in GHG from natural gas savings [kg CO2e/year]	22193.8	22193.8	22193.8	22193.8	22280.9	22280.9	23395.3	23395.3	22338.5	22338.5
Net Present Value [$]	$ 11,379.07	$ 11,018.83	$ 11,321.59	$ 10,961.71	$ 11,210.27	$ 10,850.03	$ 15,796.45	$ 15,431.28	$ 11,162.38	$ 10,802.14
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

ROWHOUSE Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 17,378.64	$ 17,378.64	$ 16,778.64	$ 16,778.64	$ 17,818.64	$ 17,818.64	$ 17,928.64	$ 17,928.64	$ 18,228.64	$ 18,228.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 26,102.72	$ 26,102.72	$ 25,201.52	$ 25,201.52	$ 26,763.6	$ 26,763.6	$ 26,928.82	$ 26,928.82	$ 27,379.42	$ 27,379.42
Net Present Value [$]	$ 15,796.45	$ 15,431.28	$ 11,379.07	$ 11,018.83	$ 15,740.24	$ 15,379.09	$ 15,567.03	$ 15,202.04	$ 15,478.78	$ 15,113.98
Incremental dollars per GHG saving	$ .75	$ .75	$ .77	$ .77	$ .77	$ .77	$ .77	$ .77	$ .79	$ .79
Auxiliary Energy Required Heating [GJ/yr]	231.2	232.3	229.6	230.7	230	231.1	231.2	232.3	231.3	232.4
Annual Energy DHW [GJ/yr]	91.9	91.9	115.2	115.2	91.9	91.9	90.4	90.4	89.4	89.4
Annual Energy Space Heating [GJ/yr]	118.4	119	118.1	118.6	117.9	118.4	118.5	119	118.5	119
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	367.9	368.4	391	391.5	367.4	367.9	366.5	367	365.5	366.1
Design Heating Load [W]	41200.4	41352.6	41617.4	41769.6	41028	41180.2	41200.4	41352.6	41200.4	41352.6
Annual Energy Electricity [kWh/yr]	76689.4	76831.2	76596.6	76736.5	76540.3	76680.6	76691.4	76833.2	76692.8	76834.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,788.24	$ 10,808.3	$ 10,775.1	$ 10,794.9	$ 10,767.14	$ 10,786.99	$ 10,788.52	$ 10,808.58	$ 10,788.72	$ 10,808.77
Annual Energy Natural Gas [m3/yr]	2466.5	2466.5	3094	3094	2466.5	2466.5	2427.6	2427.6	2401.9	2401.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,063.96	$ 1,063.96	$ 1,334.64	$ 1,334.64	$ 1,063.96	$ 1,063.96	$ 1,047.18	$ 1,047.18	$ 1,036.1	$ 1,036.1
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	32971	33511	32968	33508	32989	33529	32972	33512	32973	33513
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	5.48	5.48	6.66	6.67	5.48	5.48	5.41	5.41	5.36	5.36
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	63.3	63.6	62.8	63.1	62.9	63.2	63.3	63.6	63.3	63.6
Output: MEUI [kWh/(m2 * yr)]	58.5	58.6	64.8	64.9	58.4	58.5	58.1	58.3	57.9	58
Output: Better than ERS (%)	420.0%	410.0%	40.0%	60.0%	430.0%	420.0%	460.0%	440.0%	480.0%	470.0%
Output: Better than Envelope (%)	2560.0%	2520.0%	2610.0%	2570.0%	2600.0%	2560.0%	2560.0%	2520.0%	2560.0%	2520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26869	27011	26776	26916	26720	26860	26871	27013	26872	27014
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,788.51	$ 3,808.51	$ 3,775.43	$ 3,795.16	$ 3,767.49	$ 3,787.27	$ 3,788.8	$ 3,808.79	$ 3,788.99	$ 3,808.97
Annual savings in carbon tax for electricity [$/year]	$ 13.43	$ 13.51	$ 13.39	$ 13.46	$ 13.36	$ 13.43	$ 13.44	$ 13.51	$ 13.44	$ 13.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,801.95	$ 3,822.01	$ 3,788.82	$ 3,808.61	$ 3,780.85	$ 3,800.7	$ 3,802.23	$ 3,822.3	$ 3,802.43	$ 3,822.48
Annual savings in GHG from electricity savings [kg CO2e/year]	295.6	297.1	294.5	296.1	293.9	295.5	295.6	297.1	295.6	297.2
Annual savings in natural gas [m3/year]	455.26	455.26	431.88	431.88	455.26	455.26	456.71	456.71	457.67	457.67
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,217.98	$ 4,217.98	$ 4,001.36	$ 4,001.36	$ 4,217.98	$ 4,217.98	$ 4,231.41	$ 4,231.41	$ 4,240.28	$ 4,240.28
Annual savings in carbon tax for natural gas [$/year]	$ 1,052.79	$ 1,052.79	$ 998.72	$ 998.72	$ 1,052.79	$ 1,052.79	$ 1,056.14	$ 1,056.14	$ 1,058.35	$ 1,058.35
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,270.76	$ 5,270.76	$ 5,000.08	$ 5,000.08	$ 5,270.76	$ 5,270.76	$ 5,287.54	$ 5,287.54	$ 5,298.63	$ 5,298.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	23395.3	23395.3	22193.8	22193.8	23395.3	23395.3	23469.8	23469.8	23519	23519
Net Present Value [$]	$ 15,796.45	$ 15,431.28	$ 11,379.07	$ 11,018.83	$ 15,740.24	$ 15,379.09	$ 15,567.03	$ 15,202.04	$ 15,478.78	$ 15,113.98
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.

ROWHOUSE Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 27,128.25	$ 27,238.25	$ 27,538.25	$ 27,678.25	$ 27,238.25	$ 27,978.25	$ 27,538.25	$ 27,678.25	$ 27,978.25	$ 30,734.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 40,746.63	$ 40,911.85	$ 41,362.45	$ 41,572.73	$ 40,911.85	$ 42,023.33	$ 41,362.45	$ 41,572.73	$ 42,023.33	$ 46,163.43
Net Present Value [$]	$ 54,634.51	$ 54,582.52	$ 54,495.32	$ 54,406.02	$ 54,337.94	$ 54,319.18	$ 54,250.75	$ 54,162.05	$ 54,074.85	$ 52,662.39
Incremental dollars per GHG saving	$ 1.77	$ 1.78	$ 1.79	$ 1.8	$ 1.79	$ 1.82	$ 1.8	$ 1.81	$ 1.82	$ 1.97
Auxiliary Energy Required Heating [GJ/yr]	152.8	153.8	153.8	152.8	154.8	152.8	154.8	153.8	153.8	146.2
Annual Energy DHW [GJ/yr]	91.9	90.4	89.4	90.4	90.4	89.4	89.4	90.4	89.4	91.9
Annual Energy Space Heating [GJ/yr]	161.8	162.9	163	161.8	164	161.8	164	162.9	162.9	154.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	408.9	408.6	407.7	407.5	409.7	406.5	408.7	408.5	407.6	401.9
Design Heating Load [W]	33106.7	33279.1	33279.1	33106.7	33431.3	33106.7	33431.3	33258.9	33258.9	31387.3
Annual Energy Electricity [kWh/yr]	43934.2	43939.9	43939.9	43934.2	43945.1	43934.2	43945.1	43939.5	43939.5	43899.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,153.37	$ 6,154.18	$ 6,154.18	$ 6,153.37	$ 6,154.92	$ 6,153.39	$ 6,154.92	$ 6,154.12	$ 6,154.12	$ 6,148.44
Annual Energy Natural Gas [m3/yr]	6733.2	6724.5	6699.1	6694.8	6752.1	6669.3	6726.7	6722.3	6696.9	6548.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,904.47	$ 2,900.71	$ 2,889.76	$ 2,887.9	$ 2,912.62	$ 2,876.9	$ 2,901.66	$ 2,899.77	$ 2,888.81	$ 2,824.92
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	36598	36581	36582	36599	37121	36600	37122	37139	37140	51952
Upgrade Package List	Pkg2200102033	Pkg2200102032	Pkg2200102032	Pkg2200102033	Pkg2200112032	Pkg2200102033	Pkg2200112032	Pkg2200112033	Pkg2200112033	Pkg3200231032
GHGI [kg/m2]	13.17	13.16	13.11	13.1	13.21	13.05	13.16	13.15	13.1	12.82
% ICC	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.2%	1.3%	1.3%	1.4%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	41.8	42.1	42.1	41.8	42.4	41.8	42.4	42.1	42.1	40
Output: MEUI [kWh/(m2 * yr)]	69.8	69.7	69.5	69.4	70	69.2	69.8	69.7	69.4	67.9
Output: Better than ERS (%)	220.0%	220.0%	190.0%	190.0%	240.0%	160.0%	220.0%	210.0%	190.0%	50.0%
Output: Better than Envelope (%)	5080.0%	5050.0%	5050.0%	5080.0%	5020.0%	5080.0%	5020.0%	5050.0%	5050.0%	5290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5886	5881	5881	5886	5875	5886	5875	5881	5881	5921
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 829.97	$ 829.16	$ 829.16	$ 829.97	$ 828.43	$ 829.95	$ 828.43	$ 829.22	$ 829.22	$ 834.89
Annual savings in carbon tax for electricity [$/year]	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.94	$ 2.96
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 832.91	$ 832.1	$ 832.1	$ 832.91	$ 831.37	$ 832.9	$ 831.37	$ 832.16	$ 832.16	$ 837.85
Annual savings in GHG from electricity savings [kg CO2e/year]	64.7	64.7	64.7	64.7	64.6	64.7	64.6	64.7	64.7	65.1
Annual savings in natural gas [m3/year]	296.29	296.61	297.56	297.72	295.58	298.67	296.53	296.69	297.64	303.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,745.1	$ 2,748.1	$ 2,756.87	$ 2,758.35	$ 2,738.57	$ 2,767.15	$ 2,747.34	$ 2,748.86	$ 2,757.63	$ 2,808.75
Annual savings in carbon tax for natural gas [$/year]	$ 685.16	$ 685.91	$ 688.1	$ 688.47	$ 683.53	$ 690.67	$ 685.72	$ 686.1	$ 688.29	$ 701.05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,430.26	$ 3,434.01	$ 3,444.97	$ 3,446.82	$ 3,422.11	$ 3,457.82	$ 3,433.06	$ 3,434.96	$ 3,445.92	$ 3,509.8
Annual savings in GHG from natural gas savings [kg CO2e/year]	15225.8	15242.5	15291.1	15299.4	15189.7	15348.2	15238.3	15246.7	15295.3	15578.9
Net Present Value [$]	$ 54,634.51	$ 54,582.52	$ 54,495.32	$ 54,406.02	$ 54,337.94	$ 54,319.18	$ 54,250.75	$ 54,162.05	$ 54,074.85	$ 52,662.39
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 4,092.2
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NA	NA	BC ExpFloor R36
Exposed Floor RSI	5.02	5.02	5.02	5.02	4.67	5.02	4.67	4.67	4.67	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$ 850.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 850.	$.

ROWHOUSE Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 32,710.11	$ 33,005.58	$ 33,150.11	$ 33,260.11	$ 33,284.64	$ 33,310.11	$ 33,445.58	$ 33,555.58	$ 33,560.11	$ 33,605.58
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 49,130.59	$ 49,574.38	$ 49,791.47	$ 49,956.69	$ 49,993.53	$ 50,031.79	$ 50,235.26	$ 50,400.48	$ 50,407.29	$ 50,475.58
Net Present Value [$]	$ 21,590.12	$ 22,133.63	$ 21,526.07	$ 21,421.08	$ 22,300.81	$ 26,066.66	$ 22,039.08	$ 21,964.59	$ 21,373.19	$ 26,619.11
Incremental dollars per GHG saving	$ 1.49	$ 1.5	$ 1.51	$ 1.51	$ 1.51	$ 1.44	$ 1.52	$ 1.52	$ 1.52	$ 1.45
Auxiliary Energy Required Heating [GJ/yr]	148.5	146.1	147.4	148.5	144.7	149.9	145	146.1	148.5	147.5
Annual Energy DHW [GJ/yr]	115.2	115.2	115.2	113.5	115.2	91.9	115.2	113.5	112.4	91.9
Annual Energy Space Heating [GJ/yr]	80.3	79.2	79.8	80.3	78.5	80.8	78.7	79.2	80.3	79.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	354.4	353.2	353.9	352.7	352.6	331.3	352.8	351.5	351.6	330.1
Design Heating Load [W]	33327.4	32954	33155.1	33327.4	32753.2	32951.8	32781.7	32954	33327.4	32578.4
Annual Energy Electricity [kWh/yr]	66441.7	66115.8	66295.7	66441.7	65942.5	66511.8	65981.6	66115.8	66441.7	66182.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,338.19	$ 9,292.07	$ 9,317.53	$ 9,338.19	$ 9,267.55	$ 9,348.1	$ 9,273.08	$ 9,292.07	$ 9,338.19	$ 9,301.49
Annual Energy Natural Gas [m3/yr]	3094.1	3094.1	3094.1	3048.6	3094.1	2466.5	3094.1	3048.6	3018.5	2466.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,334.69	$ 1,334.69	$ 1,334.69	$ 1,315.06	$ 1,334.69	$ 1,063.96	$ 1,334.69	$ 1,315.06	$ 1,302.08	$ 1,063.96
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	50662	51310	50680	50663	51958	50665	51328	51311	50664	51313
Upgrade Package List	Pkg3200211032	Pkg3200211032	Pkg3200211033	Pkg3200211032	Pkg3200211032	Pkg3200211032	Pkg3200211033	Pkg3200211032	Pkg3200211032	Pkg3200211032
GHGI [kg/m2]	6.55	6.55	6.55	6.47	6.55	5.37	6.55	6.46	6.41	5.37
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	40.6	40	40.3	40.6	39.6	41	39.7	40	40.6	40.4
Output: MEUI [kWh/(m2 * yr)]	54.8	54.4	54.6	54.3	54.3	48.4	54.3	54	54	48.1
Output: Better than ERS (%)	900.0%	930.0%	910.0%	940.0%	940.0%	1370.0%	940.0%	970.0%	970.0%	1400.0%
Output: Better than Envelope (%)	5220.0%	5300.0%	5260.0%	5220.0%	5340.0%	5180.0%	5330.0%	5300.0%	5220.0%	5250.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16621	16295	16475	16621	16122	16691	16161	16295	16621	16362
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,343.59	$ 2,297.64	$ 2,323.	$ 2,343.59	$ 2,273.2	$ 2,353.47	$ 2,278.72	$ 2,297.64	$ 2,343.59	$ 2,307.03
Annual savings in carbon tax for electricity [$/year]	$ 8.31	$ 8.15	$ 8.24	$ 8.31	$ 8.06	$ 8.35	$ 8.08	$ 8.15	$ 8.31	$ 8.18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,351.9	$ 2,305.78	$ 2,331.24	$ 2,351.9	$ 2,281.26	$ 2,361.82	$ 2,286.8	$ 2,305.78	$ 2,351.9	$ 2,315.21
Annual savings in GHG from electricity savings [kg CO2e/year]	182.8	179.2	181.2	182.8	177.3	183.6	177.8	179.2	182.8	180
Annual savings in natural gas [m3/year]	431.88	431.88	431.88	433.57	431.88	455.26	431.88	433.57	434.69	455.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,001.33	$ 4,001.33	$ 4,001.33	$ 4,017.03	$ 4,001.33	$ 4,217.98	$ 4,001.33	$ 4,017.03	$ 4,027.42	$ 4,217.98
Annual savings in carbon tax for natural gas [$/year]	$ 998.71	$ 998.71	$ 998.71	$ 1,002.63	$ 998.71	$ 1,052.79	$ 998.71	$ 1,002.63	$ 1,005.23	$ 1,052.79
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,000.04	$ 5,000.04	$ 5,000.04	$ 5,019.67	$ 5,000.04	$ 5,270.76	$ 5,000.04	$ 5,019.67	$ 5,032.65	$ 5,270.76
Annual savings in GHG from natural gas savings [kg CO2e/year]	22193.6	22193.6	22193.6	22280.7	22193.6	23395.3	22193.6	22280.7	22338.4	23395.3
Net Present Value [$]	$ 21,590.12	$ 22,133.63	$ 21,526.07	$ 21,421.08	$ 22,300.81	$ 26,066.66	$ 22,039.08	$ 21,964.59	$ 21,373.19	$ 26,619.11
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	NA	BC ExpFloor R32	NA	NA	BC ExpFloor R36	NA	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32
Exposed Floor RSI	4.67	5.64	4.67	4.67	6.34	4.67	5.64	5.64	4.67	5.64
Exposed Floor Cost of Upgrade	$.	$ 295.47	$.	$.	$ 574.53	$.	$ 295.47	$ 295.47	$.	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 600.	$.	$.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$.	$.	$ 550.	$ 850.	$.

ROWHOUSE Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 36,785.66	$ 36,946.6	$ 37,015.95	$ 37,068.98	$ 37,073.69	$ 37,225.66	$ 37,234.63	$ 37,268.98	$ 37,311.42	$ 37,335.66
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 55,252.06	$ 55,493.79	$ 55,597.96	$ 55,677.61	$ 55,684.68	$ 55,912.94	$ 55,926.41	$ 55,978.01	$ 56,041.75	$ 56,078.16
Net Present Value [$]	$ 4,651.39	$ 4,384.19	$ 5,010.85	$ 5,231.88	$ 4,644.18	$ 4,586.97	$ 4,376.97	$ 4,766.4	$ 5,583.57	$ 4,746.65
Incremental dollars per GHG saving	$ 1.33	$ 1.33	$ 1.33	$ 1.34	$ 1.34	$ 1.34	$ 1.34	$ 1.34	$ 1.34	$ 1.34
Auxiliary Energy Required Heating [GJ/yr]	168.5	168.8	167.8	169	167.8	167.4	168.1	168.7	165.2	168.1
Annual Energy DHW [GJ/yr]	47.2	47.2	47.2	46	47.2	47.2	47.2	46.5	47.2	46.5
Annual Energy Space Heating [GJ/yr]	88.2	88.4	87.5	88.3	87.9	87.7	88	88.2	86.3	88.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	293.4	293.6	292.6	292.2	293	292.9	293.2	292.6	291.4	292.5
Design Heating Load [W]	32372.7	32401.1	31978.6	32088.8	32066.9	32200.3	32095.4	32051.8	31605.2	32372.7
Annual Energy Electricity [kWh/yr]	81505.1	81546.4	81276	81169.6	81396	81359.2	81437.3	81272.7	80938.8	81254.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,469.66	$ 11,475.5	$ 11,437.24	$ 11,422.18	$ 11,454.22	$ 11,449.01	$ 11,460.06	$ 11,436.77	$ 11,389.53	$ 11,434.2
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	55852	55222	56500	52200	54124	55870	53494	52217	57148	55853
Upgrade Package List	Pkg3200431032	Pkg3200421033	Pkg3300211032	Pkg3200232033	Pkg3200332032	Pkg3200431033	Pkg3200322033	Pkg3200232034	Pkg3300221032	Pkg3200431032
GHGI [kg/m2]	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	46.1	46.2	45.9	46.2	45.9	45.8	46	46.1	45.2	46
Output: MEUI [kWh/(m2 * yr)]	38.1	38.1	37.9	37.8	38	38	38	37.9	37.5	37.9
Output: Better than ERS (%)	2380.0%	2380.0%	2400.0%	2410.0%	2390.0%	2400.0%	2390.0%	2400.0%	2440.0%	2410.0%
Output: Better than Envelope (%)	4580.0%	4570.0%	4600.0%	4560.0%	4600.0%	4610.0%	4590.0%	4570.0%	4680.0%	4590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	31685	31726	31456	31349	31576	31539	31617	31452	31118	31434
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,467.53	$ 4,473.35	$ 4,435.23	$ 4,420.22	$ 4,452.15	$ 4,446.96	$ 4,457.97	$ 4,434.76	$ 4,387.68	$ 4,432.19
Annual savings in carbon tax for electricity [$/year]	$ 15.84	$ 15.86	$ 15.73	$ 15.67	$ 15.79	$ 15.77	$ 15.81	$ 15.73	$ 15.56	$ 15.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,483.37	$ 4,489.21	$ 4,450.95	$ 4,435.9	$ 4,467.93	$ 4,462.73	$ 4,473.78	$ 4,450.49	$ 4,403.24	$ 4,447.91
Annual savings in GHG from electricity savings [kg CO2e/year]	348.5	349	346	344.8	347.3	346.9	347.8	346	342.3	345.8
Annual savings in natural gas [m3/year]	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16	547.16
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42	$ 5,069.42
Annual savings in carbon tax for natural gas [$/year]	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3	$ 1,265.3
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73	$ 6,334.73
Annual savings in GHG from natural gas savings [kg CO2e/year]	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9	28117.9
Net Present Value [$]	$ 4,651.39	$ 4,384.19	$ 5,010.85	$ 5,231.88	$ 4,644.18	$ 4,586.97	$ 4,376.97	$ 4,766.4	$ 5,583.57	$ 4,746.65
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	11.2	11.2	9.02	11.2	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	5.28	5.28	5.28	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR10	BC EffR10	BC EffR14	BC EffR20	BC EffR14	BC EffR10	BC EffR10	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 6,219.22	$ 6,219.22	$ 4,092.2	$ 4,092.2	$ 5,386.91	$ 6,219.22	$ 5,386.91	$ 4,092.2	$ 4,092.2	$ 6,219.22
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R32	NA	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36
Exposed Floor RSI	6.34	5.64	4.67	6.34	6.34	6.34	5.64	6.34	5.64	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 295.47	$.	$ 574.53	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 295.47	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 55	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 850.	$.	$.	$.	$ 550.	$.	$ 550.

ROWHOUSE Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 39,977.84	$ 40,477.84	$ 40,177.84	$ 65,275.55	$ 65,557.86	$ 65,278.8	$ 42,377.27	$ 65,575.55	$ 65,296.49	$ 43,209.58
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 60,046.72	$ 60,797.72	$ 60,347.12	$ 98,043.88	$ 98,467.91	$ 98,048.76	$ 63,650.66	$ 98,494.48	$ 98,075.33	$ 64,900.79
Net Present Value [$]	$ 31,517.38	$ 31,160.33	$ 31,046.14	$ 29,244.93	$ 29,229.7	$ 29,202.79	$ 29,185.6	$ 29,157.55	$ 29,128.15	$ 29,054.06
Incremental dollars per GHG saving	$ 1.97	$ 1.99	$ 1.98	$ 3.62	$ 3.62	$ 3.62	$ 2.09	$ 3.62	$ 3.62	$ 2.11
Auxiliary Energy Required Heating [GJ/yr]	144.9	144.3	144.6	102.5	100.1	101.4	144.6	102.5	103.8	141.8
Annual Energy DHW [GJ/yr]	46	46	46.5	90.4	91.9	91.9	46	89.4	89.4	46
Annual Energy Space Heating [GJ/yr]	153.5	152.9	153.2	108.6	106.1	107.4	153.2	108.6	109.9	150.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	354.7	354.1	354.9	354.3	353.2	354.5	354.4	353.3	354.6	351.4
Design Heating Load [W]	27892	27855.1	27855.1	25272.4	25086	25286.8	27661.2	25272.4	25473.2	27474.8
Annual Energy Electricity [kWh/yr]	56662.2	56659.1	56794.6	43668.7	43656	43662.6	56660.7	43668.8	43675.3	56645.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,954.39	$ 7,953.95	$ 7,973.12	$ 6,115.81	$ 6,114.01	$ 6,114.94	$ 7,954.17	$ 6,115.82	$ 6,116.74	$ 7,952.07
Annual Energy Natural Gas [m3/yr]	4047	4030.9	4038.7	5291.7	5263.7	5298.2	4039.4	5266.3	5301.1	3960.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,745.73	$ 1,738.79	$ 1,742.15	$ 2,282.65	$ 2,270.58	$ 2,285.46	$ 1,742.46	$ 2,271.7	$ 2,286.71	$ 1,708.34
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	65493	65511	65510	62969	63832	63544	64773	62970	62682	65637
Upgrade Package List	Pkg4300432033	Pkg4300432034	Pkg4300432034	Pkg4200332053	Pkg4200432053	Pkg4200422053	Pkg4300333033	Pkg4200322053	Pkg4200322053	Pkg4300433033
GHGI [kg/m2]	8.25	8.21	8.23	10.45	10.4	10.46	8.23	10.4	10.47	8.08
% ICC	1.8%	1.8%	1.8%	2.9%	3.0%	2.9%	1.9%	3.0%	3.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	39.6	39.5	39.6	28.1	27.4	27.7	39.6	28.1	28.4	38.8
Output: MEUI [kWh/(m2 * yr)]	55	54.8	55	54.9	54.6	54.9	54.9	54.6	55	54.1
Output: Better than ERS (%)	1160.0%	1180.0%	1160.0%	1140.0%	1170.0%	1140.0%	1170.0%	1170.0%	1130.0%	1240.0%
Output: Better than Envelope (%)	5340.0%	5360.0%	5350.0%	6700.0%	6780.0%	6740.0%	5350.0%	6700.0%	6660.0%	5440.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6842	6839	6974	6152	6164	6158	6840	6152	6145	6825
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 964.68	$ 964.24	$ 983.35	$ 867.4	$ 869.19	$ 868.26	$ 964.47	$ 867.39	$ 866.47	$ 962.37
Annual savings in carbon tax for electricity [$/year]	$ 3.42	$ 3.42	$ 3.49	$ 3.08	$ 3.08	$ 3.08	$ 3.42	$ 3.08	$ 3.07	$ 3.41
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 968.1	$ 967.66	$ 986.84	$ 870.48	$ 872.28	$ 871.34	$ 967.89	$ 870.47	$ 869.55	$ 965.78
Annual savings in GHG from electricity savings [kg CO2e/year]	75.3	75.2	76.7	67.7	67.8	67.7	75.2	67.7	67.6	75.1
Annual savings in natural gas [m3/year]	396.37	396.97	396.68	350	351.04	349.75	396.65	350.94	349.65	399.6
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,672.38	$ 3,677.94	$ 3,675.25	$ 3,242.71	$ 3,252.37	$ 3,240.46	$ 3,675.01	$ 3,251.48	$ 3,239.46	$ 3,702.31
Annual savings in carbon tax for natural gas [$/year]	$ 916.61	$ 918.	$ 917.32	$ 809.36	$ 811.78	$ 808.8	$ 917.26	$ 811.55	$ 808.55	$ 924.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,588.99	$ 4,595.94	$ 4,592.57	$ 4,052.07	$ 4,064.15	$ 4,049.27	$ 4,592.27	$ 4,063.03	$ 4,048.02	$ 4,626.39
Annual savings in GHG from natural gas savings [kg CO2e/year]	20369.1	20399.9	20385	17985.9	18039.5	17973.4	20383.6	18034.5	17967.9	20535.1
Net Present Value [$]	$ 31,517.38	$ 31,160.33	$ 31,046.14	$ 29,244.93	$ 29,229.7	$ 29,202.79	$ 29,185.6	$ 29,157.55	$ 29,128.15	$ 29,054.06
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	14.09	11.2	11.2	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 5,903.32	$ 2,671.58	$ 2,671.58	$ 5,903.32
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 37,077.37	$ 37,077.37	$ 37,077.37	$ 6,941.51	$ 37,077.37	$ 37,077.37	$ 6,941.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	5.28	5.28	7.04	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 5,386.91	$ 5,386.91	$ 6,219.22
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	5.64	6.34	6.34	5.64	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 295.47	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 1,374.	$ 600.	$ 600.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 850.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.	$ 850.	$ 850.

ROWHOUSE Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 14,668.64	$ 14,778.64	$ 15,002.64	$ 15,002.64	$ 15,078.64	$ 15,078.64	$ 15,218.64	$ 15,218.64	$ 15,348.98	$ 15,348.98
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 22,032.3	$ 22,197.52	$ 22,533.97	$ 22,533.97	$ 22,648.12	$ 22,648.12	$ 22,858.4	$ 22,858.4	$ 23,054.17	$ 23,054.17
Net Present Value [$]	$ 57,848.77	$ 57,727.9	$ 35,192.59	$ 34,863.69	$ 57,649.93	$ 57,327.21	$ 57,632.95	$ 57,310.05	$ 57,994.54	$ 57,672.01
Incremental dollars per GHG saving	$ 1.1	$ 1.11	$ .94	$ .94	$ 1.13	$ 1.14	$ 1.14	$ 1.14	$ 1.14	$ 1.15
Auxiliary Energy Required Heating [GJ/yr]	306.1	307.5	342.5	343.8	307.5	308.8	306.1	307.4	302.8	304.1
Annual Energy DHW [GJ/yr]	93.6	92.1	48.1	48.1	91.1	91.1	92.1	92.1	93.6	93.6
Annual Energy Space Heating [GJ/yr]	324.2	325.7	362.7	364.1	325.7	327.1	324.2	325.6	320.7	322.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	573.1	573.1	566	567.5	572.1	573.5	571.6	573	569.6	571
Design Heating Load [W]	42637.9	42822.4	43213	43375.9	42822.4	42985.3	42637.9	42800.8	42295.7	42458.6
Annual Energy Electricity [kWh/yr]	44744.7	44752.2	58294.2	58301.2	44752.2	44759.1	44744.8	44751.7	44727.1	44733.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,268.06	$ 6,269.12	$ 8,185.31	$ 8,186.3	$ 6,269.12	$ 6,270.1	$ 6,268.07	$ 6,269.05	$ 6,265.57	$ 6,266.53
Annual Energy Natural Gas [m3/yr]	11064.2	11063.2	9564.7	9601.8	11036.7	11073.1	11024.3	11060.7	10971	11007.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 4,772.71	$ 4,772.28	$ 4,125.88	$ 4,141.88	$ 4,760.85	$ 4,776.55	$ 4,755.5	$ 4,771.2	$ 4,732.51	$ 4,748.21
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	94	77	79	619	78	618	95	635	346	886
Upgrade Package List	Pkg2100101013	Pkg2100101012	Pkg2100101012	Pkg2100111012	Pkg2100101012	Pkg2100111012	Pkg2100101013	Pkg2100111013	Pkg2100102012	Pkg2100112012
GHGI [kg/m2]	21.35	21.35	18.67	18.74	21.3	21.37	21.27	21.34	21.17	21.24
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	83.7	84.1	93.7	94.1	84.1	84.5	83.7	84.1	82.8	83.2
Output: MEUI [kWh/(m2 * yr)]	114.7	114.7	112.8	113.2	114.5	114.8	114.3	114.7	113.8	114.1
Output: Better than ERS (%)	1710.0%	1710.0%	1520.0%	1550.0%	1690.0%	1710.0%	1670.0%	1700.0%	1630.0%	1660.0%
Output: Better than Envelope (%)	1470.0%	1430.0%	460.0%	420.0%	1430.0%	1400.0%	1470.0%	1440.0%	1570.0%	1530.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	5686	5679	7863	7870	5679	5672	5686	5679	5704	5697
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 801.74	$ 800.68	$ 1,108.74	$ 1,109.73	$ 800.68	$ 799.71	$ 801.73	$ 800.75	$ 804.22	$ 803.26
Annual savings in carbon tax for electricity [$/year]	$ 2.84	$ 2.84	$ 3.93	$ 3.94	$ 2.84	$ 2.84	$ 2.84	$ 2.84	$ 2.85	$ 2.85
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 804.58	$ 803.52	$ 1,112.67	$ 1,113.66	$ 803.52	$ 802.55	$ 804.57	$ 803.59	$ 807.07	$ 806.11
Annual savings in GHG from electricity savings [kg CO2e/year]	62.5	62.5	86.5	86.6	62.5	62.4	62.5	62.5	62.7	62.7
Annual savings in natural gas [m3/year]	257.46	257.49	313.33	311.94	258.48	257.12	258.94	257.59	260.93	259.57
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 2,385.32	$ 2,385.67	$ 2,902.96	$ 2,890.15	$ 2,394.82	$ 2,382.25	$ 2,399.1	$ 2,386.53	$ 2,417.5	$ 2,404.93
Annual savings in carbon tax for natural gas [$/year]	$ 595.37	$ 595.45	$ 724.56	$ 721.37	$ 597.74	$ 594.6	$ 598.8	$ 595.67	$ 603.4	$ 600.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 2,980.69	$ 2,981.12	$ 3,627.52	$ 3,611.52	$ 2,992.55	$ 2,976.85	$ 2,997.9	$ 2,982.2	$ 3,020.89	$ 3,005.19
Annual savings in GHG from natural gas savings [kg CO2e/year]	13230.3	13232.3	16101.4	16030.4	13283	13213.3	13306.7	13237	13408.8	13339.1
Net Present Value [$]	$ 57,848.77	$ 57,727.9	$ 35,192.59	$ 34,863.69	$ 57,649.93	$ 57,327.21	$ 57,632.95	$ 57,310.05	$ 57,994.54	$ 57,672.01
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	5.02	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$ 550.	$.	$.	$ 850.	$ 850.	$ 550.	$ 550.	$.	$.

ROWHOUSE Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,152.64	$ 18,152.64	$ 16,018.64	$ 16,018.64	$ 18,592.64	$ 18,592.64	$ 15,418.64	$ 15,418.64	$ 18,702.64	$ 18,702.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,265.27	$ 27,265.27	$ 24,060.	$ 24,060.	$ 27,926.15	$ 27,926.15	$ 23,158.8	$ 23,158.8	$ 28,091.37	$ 28,091.37
Net Present Value [$]	$ 21,167.4	$ 21,667.87	$ 11,347.73	$ 11,830.48	$ 21,095.8	$ 21,585.13	$ 16,000.53	$ 16,486.03	$ 21,015.54	$ 21,516.01
Incremental dollars per GHG saving	$ .54	$ .54	$ .55	$ .55	$ .55	$ .55	$ .55	$ .55	$ .55	$ .55
Auxiliary Energy Required Heating [GJ/yr]	342.5	343.8	341.4	342.7	341	342.4	340	341.3	341.9	343.3
Annual Energy DHW [GJ/yr]	48.1	48.1	93.6	93.6	48.1	48.1	117.3	117.3	47.3	47.3
Annual Energy Space Heating [GJ/yr]	189.7	190.4	191.7	192.4	189	189.7	191.5	192.2	189.5	190.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	6.2	6.2	1.5	1.5	6.2	6.2	1.5	1.5
Total Energy [GJ/yr]	396.3	397	449.7	450.4	395.6	396.3	473.3	474	395.3	396
Design Heating Load [W]	44976.6	45139.5	45242.2	45405.1	44792.2	44955	45701.3	45864.2	44976.6	45139.5
Annual Energy Electricity [kWh/yr]	110082.4	110276.8	98915.3	99102.8	109883.7	110073.8	98886.9	99075.5	109809.8	110004.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 15,513.34	$ 15,540.85	$ 13,933.2	$ 13,959.73	$ 15,485.23	$ 15,512.13	$ 13,929.18	$ 13,955.87	$ 15,474.77	$ 15,502.28
Annual Energy Natural Gas [m3/yr]	0	0	2514.7	2514.7	0	0	3150.5	3150.5	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 1,084.75	$ 1,084.75	$.	$.	$ 1,359.02	$ 1,359.02	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	88	628	67	607	106	646	64	604	89	629
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100111013	Pkg2100101011	Pkg2100111011	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	1.19	1.19	5.81	5.82	1.19	1.19	7.01	7.01	1.19	1.19
% ICC	0.8%	0.8%	0.7%	0.7%	0.8%	0.8%	0.7%	0.7%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	93.7	94.1	93.4	93.7	93.3	93.7	93	93.4	93.5	93.9
Output: MEUI [kWh/(m2 * yr)]	66.2	66.4	80.8	81	66	66.2	87.2	87.4	66	66.1
Output: Better than ERS (%)	1590.0%	1580.0%	430.0%	410.0%	1610.0%	1590.0%	50.0%	40.0%	1610.0%	1600.0%
Output: Better than Envelope (%)	460.0%	420.0%	490.0%	450.0%	500.0%	460.0%	530.0%	490.0%	480.0%	440.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	59652	59846	48484	48672	59453	59643	48456	48645	59379	59573
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,410.88	$ 8,438.29	$ 6,836.31	$ 6,862.75	$ 8,382.86	$ 8,409.66	$ 6,832.31	$ 6,858.9	$ 8,372.44	$ 8,399.85
Annual savings in carbon tax for electricity [$/year]	$ 29.83	$ 29.92	$ 24.24	$ 24.34	$ 29.73	$ 29.82	$ 24.23	$ 24.32	$ 29.69	$ 29.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,440.7	$ 8,468.21	$ 6,860.56	$ 6,887.09	$ 8,412.59	$ 8,439.48	$ 6,856.54	$ 6,883.23	$ 8,402.13	$ 8,429.64
Annual savings in GHG from electricity savings [kg CO2e/year]	656.2	658.3	533.3	535.4	654	656.1	533	535.1	653.2	655.3
Annual savings in natural gas [m3/year]	669.7	669.7	576	576	669.7	669.7	552.31	552.31	669.7	669.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,204.73	$ 6,204.73	$ 5,336.65	$ 5,336.65	$ 6,204.73	$ 6,204.73	$ 5,117.16	$ 5,117.16	$ 6,204.73	$ 6,204.73
Annual savings in carbon tax for natural gas [$/year]	$ 1,548.67	$ 1,548.67	$ 1,332.	$ 1,332.	$ 1,548.67	$ 1,548.67	$ 1,277.22	$ 1,277.22	$ 1,548.67	$ 1,548.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,753.4	$ 7,753.4	$ 6,668.65	$ 6,668.65	$ 7,753.4	$ 7,753.4	$ 6,394.38	$ 6,394.38	$ 7,753.4	$ 7,753.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	34414.9	34414.9	29600	29600	34414.9	34414.9	28382.7	28382.7	34414.9	34414.9
Net Present Value [$]	$ 21,167.4	$ 21,667.87	$ 11,347.73	$ 11,830.48	$ 21,095.8	$ 21,585.13	$ 16,000.53	$ 16,486.03	$ 21,015.54	$ 21,516.01
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	NA	NA	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$.	$.	$ 1,800.	$ 1,800.	$.	$.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$.	$.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

ROWHOUSE Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 25,567.91	$ 26,688.25	$ 26,007.91	$ 27,128.25	$ 26,117.91	$ 21,170.15	$ 22,290.49	$ 27,238.25	$ 26,417.91	$ 25,567.91
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 38,403.	$ 40,085.75	$ 39,063.88	$ 40,746.63	$ 39,229.1	$ 31,797.57	$ 33,480.32	$ 40,911.85	$ 39,679.7	$ 38,403.
Net Present Value [$]	$ 67,265.73	$ 67,243.44	$ 67,146.14	$ 67,119.	$ 67,050.22	$ 67,050.02	$ 67,038.41	$ 67,028.54	$ 66,973.21	$ 66,964.25
Incremental dollars per GHG saving	$ 1.45	$ 1.49	$ 1.47	$ 1.51	$ 1.47	$ 1.27	$ 1.32	$ 1.51	$ 1.48	$ 1.45
Auxiliary Energy Required Heating [GJ/yr]	224	219.6	222.7	218.3	224	242.7	238.2	219.6	224	225.2
Annual Energy DHW [GJ/yr]	93.6	93.6	93.6	93.6	92.1	93.6	93.6	92.1	91.1	93.6
Annual Energy Space Heating [GJ/yr]	237.3	232.6	235.9	231.2	237.3	257	252.3	232.6	237.3	238.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	486.2	481.5	484.8	480.1	484.7	505.9	501.2	480	483.7	487.5
Design Heating Load [W]	36507.8	35981.1	36323.3	35796.6	36507.8	38607.4	38080.7	35981.1	36507.8	36670.6
Annual Energy Electricity [kWh/yr]	44310.9	44287.5	44304.1	44280.7	44311	44409.4	44385.7	44287.5	44311	44317.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,206.68	$ 6,203.37	$ 6,205.72	$ 6,202.4	$ 6,206.69	$ 6,220.62	$ 6,217.26	$ 6,203.37	$ 6,206.69	$ 6,207.58
Annual Energy Natural Gas [m3/yr]	8772.1	8648.2	8735.9	8612.6	8732.1	9292.6	9167.5	8608.2	8705.5	8806.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,783.98	$ 3,730.53	$ 3,768.36	$ 3,715.18	$ 3,766.72	$ 4,008.5	$ 3,954.54	$ 3,713.28	$ 3,755.25	$ 3,798.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	3424	3694	3442	3712	3425	184	454	3695	3426	3964
Upgrade Package List	Pkg2200101032	Pkg2200102032	Pkg2200101033	Pkg2200102033	Pkg2200101032	Pkg2100101032	Pkg2100102032	Pkg2200102032	Pkg2200101032	Pkg2200111032
GHGI [kg/m2]	17.02	16.79	16.95	16.72	16.95	18	17.77	16.71	16.9	17.09
% ICC	1.2%	1.2%	1.2%	1.2%	1.2%	1.0%	1.0%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	61.3	60.1	60.9	59.7	61.3	66.4	65.2	60.1	61.3	61.6
Output: MEUI [kWh/(m2 * yr)]	90.9	89.7	90.6	89.3	90.5	96.3	95	89.3	90.3	91.3
Output: Better than ERS (%)	70.0%	170.0%	100.0%	190.0%	100.0%	330.0%	240.0%	200.0%	120.0%	40.0%
Output: Better than Envelope (%)	3760.0%	3880.0%	3800.0%	3920.0%	3760.0%	3240.0%	3360.0%	3880.0%	3760.0%	3730.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6120	6143	6127	6150	6120	6021	6045	6143	6120	6114
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 862.91	$ 866.21	$ 863.86	$ 867.16	$ 862.89	$ 849.02	$ 852.36	$ 866.21	$ 862.89	$ 862.
Annual savings in carbon tax for electricity [$/year]	$ 3.06	$ 3.07	$ 3.06	$ 3.08	$ 3.06	$ 3.01	$ 3.02	$ 3.07	$ 3.06	$ 3.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 865.97	$ 869.28	$ 866.93	$ 870.24	$ 865.95	$ 852.03	$ 855.38	$ 869.28	$ 865.95	$ 865.06
Annual savings in GHG from electricity savings [kg CO2e/year]	67.3	67.6	67.4	67.7	67.3	66.2	66.5	67.6	67.3	67.2
Annual savings in natural gas [m3/year]	342.86	347.47	344.21	348.8	344.35	323.46	328.12	348.96	345.34	341.59
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,176.57	$ 3,219.34	$ 3,189.06	$ 3,231.63	$ 3,190.37	$ 2,996.89	$ 3,040.07	$ 3,233.15	$ 3,199.56	$ 3,164.83
Annual savings in carbon tax for natural gas [$/year]	$ 792.86	$ 803.53	$ 795.97	$ 806.6	$ 796.3	$ 748.01	$ 758.79	$ 806.98	$ 798.59	$ 789.93
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 3,969.42	$ 4,022.87	$ 3,985.04	$ 4,038.22	$ 3,986.68	$ 3,744.9	$ 3,798.86	$ 4,040.12	$ 3,998.15	$ 3,954.76
Annual savings in GHG from natural gas savings [kg CO2e/year]	17619	17856.2	17688.3	17924.4	17695.6	16622.4	16861.9	17932.8	17746.5	17553.9
Net Present Value [$]	$ 67,265.73	$ 67,243.44	$ 67,146.14	$ 67,119.	$ 67,050.22	$ 67,050.02	$ 67,038.41	$ 67,028.54	$ 66,973.21	$ 66,964.25
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	11.2	9.02	11.2	9.02	9.02	11.2	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	3.87	3.87	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 9,467.4	$ 9,467.4	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	5.02	5.02	5.02	5.02	5.02	5.02	5.02	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	DWHR eff 30	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$ 550.	$ 850.	$.

ROWHOUSE Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 21,176.4	$ 21,616.4	$ 21,616.4	$ 21,726.4	$ 22,026.4	$ 22,166.4	$ 22,166.4	$ 22,216.4	$ 22,296.74	$ 22,296.74
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 31,806.95	$ 32,467.83	$ 32,467.83	$ 32,633.05	$ 33,083.65	$ 33,293.93	$ 33,293.93	$ 33,369.03	$ 33,489.7	$ 33,489.7
Net Present Value [$]	$ 1,787.14	$ 1,854.	$ 1,368.68	$ 1,634.35	$ 1,598.11	$ 1,701.21	$ 1,215.9	$ 6,522.68	$ 2,327.78	$ 1,844.84
Incremental dollars per GHG saving	$ .76	$ .77	$ .77	$ .78	$ .78	$ .79	$ .79	$ .76	$ .8	$ .8
Auxiliary Energy Required Heating [GJ/yr]	286.5	285.2	286.4	286.5	286.5	285.2	286.4	286.3	281.8	283.1
Annual Energy DHW [GJ/yr]	117.3	117.3	117.3	115.6	114.4	115.6	115.6	93.6	117.3	117.3
Annual Energy Space Heating [GJ/yr]	163.4	162.7	163.4	163.4	163.4	162.7	163.4	162.9	161.1	161.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	440.4	439.7	440.4	438.6	437.5	437.9	438.6	416.1	438.1	438.7
Design Heating Load [W]	42877	42692.5	42855.4	42877	42877	42692.5	42855.4	42233.4	42350.3	42513.2
Annual Energy Electricity [kWh/yr]	89741.1	89544.2	89732.7	89741.1	89741.1	89544.2	89732.7	89566.4	89095.9	89283.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,635.05	$ 12,607.19	$ 12,633.86	$ 12,635.05	$ 12,635.05	$ 12,607.19	$ 12,633.86	$ 12,610.33	$ 12,543.75	$ 12,570.3
Annual Energy Natural Gas [m3/yr]	3150.5	3150.5	3150.5	3103.1	3071.6	3103.1	3103.1	2514.7	3150.5	3150.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,359.02	$ 1,359.02	$ 1,359.02	$ 1,338.57	$ 1,324.98	$ 1,338.57	$ 1,338.57	$ 1,084.75	$ 1,359.02	$ 1,359.02
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	3322	3340	3880	3323	3324	3341	3881	3343	3592	4132
Upgrade Package List	Pkg2200101012	Pkg2200101013	Pkg2200111013	Pkg2200101012	Pkg2200101012	Pkg2200101013	Pkg2200111013	Pkg2200101013	Pkg2200102012	Pkg2200112012
GHGI [kg/m2]	6.91	6.91	6.91	6.82	6.76	6.82	6.82	5.71	6.91	6.91
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	78.4	78	78.4	78.4	78.4	78	78.4	78.3	77.1	77.5
Output: MEUI [kWh/(m2 * yr)]	78.2	78	78.2	77.7	77.4	77.6	77.7	71.6	77.6	77.8
Output: Better than ERS (%)	740.0%	760.0%	740.0%	780.0%	800.0%	790.0%	780.0%	1140.0%	790.0%	780.0%
Output: Better than Envelope (%)	2020.0%	2060.0%	2020.0%	2020.0%	2020.0%	2060.0%	2020.0%	2030.0%	2150.0%	2110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	39310	39113	39302	39310	39310	39113	39302	39136	38665	38853
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,542.75	$ 5,514.99	$ 5,541.57	$ 5,542.75	$ 5,542.75	$ 5,514.99	$ 5,541.57	$ 5,518.12	$ 5,451.78	$ 5,478.23
Annual savings in carbon tax for electricity [$/year]	$ 19.66	$ 19.56	$ 19.65	$ 19.66	$ 19.66	$ 19.56	$ 19.65	$ 19.57	$ 19.33	$ 19.43
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,562.41	$ 5,534.55	$ 5,561.22	$ 5,562.41	$ 5,562.41	$ 5,534.55	$ 5,561.22	$ 5,537.69	$ 5,471.11	$ 5,497.66
Annual savings in GHG from electricity savings [kg CO2e/year]	432.4	430.2	432.3	432.4	432.4	430.2	432.3	430.5	425.3	427.4
Annual savings in natural gas [m3/year]	552.31	552.31	552.31	554.08	555.25	554.08	554.08	576	552.31	552.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 5,117.16	$ 5,117.16	$ 5,117.16	$ 5,133.53	$ 5,144.4	$ 5,133.53	$ 5,133.53	$ 5,336.65	$ 5,117.16	$ 5,117.16
Annual savings in carbon tax for natural gas [$/year]	$ 1,277.22	$ 1,277.22	$ 1,277.22	$ 1,281.3	$ 1,284.02	$ 1,281.3	$ 1,281.3	$ 1,332.	$ 1,277.22	$ 1,277.22
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 6,394.38	$ 6,394.38	$ 6,394.38	$ 6,414.83	$ 6,428.42	$ 6,414.83	$ 6,414.83	$ 6,668.65	$ 6,394.38	$ 6,394.38
Annual savings in GHG from natural gas savings [kg CO2e/year]	28382.7	28382.7	28382.7	28473.4	28533.7	28473.4	28473.4	29600	28382.7	28382.7
Net Present Value [$]	$ 1,787.14	$ 1,854.	$ 1,368.68	$ 1,634.35	$ 1,598.11	$ 1,701.21	$ 1,215.9	$ 6,522.68	$ 2,327.78	$ 1,844.84
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.2	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	5.02	4.67	5.02	5.02	5.02	4.67	5.02	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 600.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 550.	$.	$.	$.

ROWHOUSE Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 25,094.15	$ 25,094.15	$ 25,534.15	$ 25,534.15	$ 25,644.15	$ 25,644.15	$ 21,176.4	$ 22,216.4	$ 25,944.15	$ 25,944.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,691.41	$ 37,691.41	$ 38,352.29	$ 38,352.29	$ 38,517.51	$ 38,517.51	$ 31,806.95	$ 33,369.03	$ 38,968.11	$ 38,968.11
Net Present Value [$]	$ 5,698.06	$ 6,177.9	$ 5,641.07	$ 6,116.88	$ 5,559.9	$ 6,036.45	$ 1,787.14	$ 6,522.68	$ 5,399.97	$ 5,876.52
Incremental dollars per GHG saving	$ .74	$ .74	$ .75	$ .75	$ .76	$ .76	$ .76	$ .76	$ .77	$ .77
Auxiliary Energy Required Heating [GJ/yr]	274.2	275.4	272.8	274.1	273.7	274.9	286.5	286.3	273.3	274.6
Annual Energy DHW [GJ/yr]	48.1	48.1	48.1	48.1	47.3	47.3	117.3	93.6	46.8	46.8
Annual Energy Space Heating [GJ/yr]	156.8	157.5	156.1	156.8	156.6	157.2	163.4	162.9	156.4	157.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	365	365.6	364.3	364.9	364	364.7	440.4	416.1	363.4	364
Design Heating Load [W]	40761.6	40924.5	40577.2	40740	40761.6	40924.5	42877	42233.4	40761.6	40924.5
Annual Energy Electricity [kWh/yr]	101377.3	101563.7	101184.3	101369.1	101110	101295.1	89741.1	89566.4	100931.4	101116.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,281.57	$ 14,307.95	$ 14,254.26	$ 14,280.41	$ 14,243.75	$ 14,269.94	$ 12,635.05	$ 12,610.33	$ 14,218.48	$ 14,244.67
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	3150.5	2514.7	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$ 1,359.02	$ 1,084.75	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	196	736	214	754	197	737	3322	3343	198	738
Upgrade Package List	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033	Pkg2100101032	Pkg2100111032	Pkg2200101012	Pkg2200101013	Pkg2100101032	Pkg2100111032
GHGI [kg/m2]	1.1	1.1	1.1	1.1	1.1	1.1	6.91	5.71	1.09	1.1
% ICC	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.0%	1.0%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	75	75.3	74.6	75	74.9	75.2	78.4	78.3	74.8	75.1
Output: MEUI [kWh/(m2 * yr)]	57.6	57.8	57.4	57.6	57.3	57.5	78.2	71.6	57.1	57.3
Output: Better than ERS (%)	2260.0%	2240.0%	2270.0%	2260.0%	2280.0%	2260.0%	740.0%	1140.0%	2290.0%	2280.0%
Output: Better than Envelope (%)	2360.0%	2330.0%	2400.0%	2360.0%	2380.0%	2340.0%	2020.0%	2030.0%	2390.0%	2350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	50946	51133	50754	50938	50679	50864	39310	39136	50501	50686
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,183.46	$ 7,209.74	$ 7,156.24	$ 7,182.3	$ 7,145.77	$ 7,171.87	$ 5,542.75	$ 5,518.12	$ 7,120.58	$ 7,146.68
Annual savings in carbon tax for electricity [$/year]	$ 25.47	$ 25.57	$ 25.38	$ 25.47	$ 25.34	$ 25.43	$ 19.66	$ 19.57	$ 25.25	$ 25.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,208.93	$ 7,235.31	$ 7,181.62	$ 7,207.77	$ 7,171.11	$ 7,197.3	$ 5,562.41	$ 5,537.69	$ 7,145.83	$ 7,172.03
Annual savings in GHG from electricity savings [kg CO2e/year]	560.4	562.5	558.3	560.3	557.5	559.5	432.4	430.5	555.5	557.5
Annual savings in natural gas [m3/year]	669.7	669.7	669.7	669.7	669.7	669.7	552.31	576	669.7	669.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,204.73	$ 6,204.73	$ 6,204.73	$ 6,204.73	$ 6,204.73	$ 6,204.73	$ 5,117.16	$ 5,336.65	$ 6,204.73	$ 6,204.73
Annual savings in carbon tax for natural gas [$/year]	$ 1,548.67	$ 1,548.67	$ 1,548.67	$ 1,548.67	$ 1,548.67	$ 1,548.67	$ 1,277.22	$ 1,332.	$ 1,548.67	$ 1,548.67
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,753.4	$ 7,753.4	$ 7,753.4	$ 7,753.4	$ 7,753.4	$ 7,753.4	$ 6,394.38	$ 6,668.65	$ 7,753.4	$ 7,753.4
Annual savings in GHG from natural gas savings [kg CO2e/year]	34414.9	34414.9	34414.9	34414.9	34414.9	34414.9	28382.7	29600	34414.9	34414.9
Net Present Value [$]	$ 5,698.06	$ 6,177.9	$ 5,641.07	$ 6,116.88	$ 5,559.9	$ 6,036.45	$ 1,787.14	$ 6,522.68	$ 5,399.97	$ 5,876.52
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$.	$.	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 13,865.16	$ 13,865.16	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	5.02	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	NA	NA	DWHR eff 55	DWHR eff 55
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$ 600.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$.	$.	$ 850.	$ 850.

ROWHOUSE Fort Nelson: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 37,521.53	$ 38,353.84	$ 37,242.47	$ 34,589.69	$ 38,071.53	$ 38,074.78	$ 35,422.	$ 34,310.63	$ 38,371.53	$ 38,903.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,357.34	$ 57,607.47	$ 55,938.19	$ 51,953.71	$ 57,183.44	$ 57,188.32	$ 53,203.84	$ 51,534.57	$ 57,634.04	$ 58,433.57
Net Present Value [$]	$ 66,566.86	$ 66,446.96	$ 66,446.93	$ 66,422.78	$ 66,352.31	$ 66,328.01	$ 66,313.02	$ 66,298.55	$ 66,275.06	$ 66,232.78
Incremental dollars per GHG saving	$ 1.87	$ 1.89	$ 1.86	$ 1.78	$ 1.89	$ 1.89	$ 1.81	$ 1.77	$ 1.9	$ 1.91
Auxiliary Energy Required Heating [GJ/yr]	178.6	175.7	180.2	191	178.6	177.3	188.1	192.6	178.6	175.7
Annual Energy DHW [GJ/yr]	93.6	93.6	93.6	93.6	92.1	93.6	93.6	93.6	91.1	92.1
Annual Energy Space Heating [GJ/yr]	189.1	186.1	190.8	202.3	189.2	187.8	199.2	204	189.2	186.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	438	435	439.7	451.2	436.5	436.7	448.1	452.9	435.6	433.5
Design Heating Load [W]	29961	29759.1	30175.9	31404.5	29961	29973.9	31202.6	31619.4	29961	29759.1
Annual Energy Electricity [kWh/yr]	44070.6	44055.4	44079.1	44136.3	44070.7	44063.9	44120.8	44144.9	44070.7	44055.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,172.67	$ 6,170.52	$ 6,173.88	$ 6,181.97	$ 6,172.69	$ 6,171.73	$ 6,179.78	$ 6,183.19	$ 6,172.69	$ 6,170.52
Annual Energy Natural Gas [m3/yr]	7502.3	7421.9	7547.3	7849.3	7462.2	7466.8	7767.8	7894.8	7435.6	7381.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,236.23	$ 3,201.55	$ 3,255.64	$ 3,385.91	$ 3,218.93	$ 3,220.92	$ 3,350.76	$ 3,405.54	$ 3,207.46	$ 3,184.25
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	31738	32602	31450	30010	31739	32314	30874	29722	31740	32603
Upgrade Package List	Pkg4300332033	Pkg4300432033	Pkg4300322033	Pkg4200332033	Pkg4300332033	Pkg4300422033	Pkg4200432033	Pkg4200322033	Pkg4300332033	Pkg4300432033
GHGI [kg/m2]	14.62	14.47	14.71	15.28	14.55	14.56	15.13	15.37	14.5	14.4
% ICC	1.7%	1.7%	1.7%	1.6%	1.7%	1.7%	1.6%	1.6%	1.7%	1.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	48.8	48.1	49.3	52.2	48.9	48.5	51.4	52.7	48.9	48.1
Output: MEUI [kWh/(m2 * yr)]	77.8	76.9	78.2	81.4	77.4	77.4	80.5	81.8	77.1	76.5
Output: Better than ERS (%)	1050.0%	1120.0%	1020.0%	780.0%	1080.0%	1080.0%	850.0%	750.0%	1100.0%	1150.0%
Output: Better than Envelope (%)	5030.0%	5110.0%	4980.0%	4680.0%	5030.0%	5060.0%	4760.0%	4640.0%	5030.0%	5110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6360	6375	6352	6294	6360	6367	6310	6286	6360	6375
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 896.79	$ 898.93	$ 895.59	$ 887.52	$ 896.77	$ 897.73	$ 889.71	$ 886.31	$ 896.77	$ 898.93
Annual savings in carbon tax for electricity [$/year]	$ 3.18	$ 3.19	$ 3.18	$ 3.15	$ 3.18	$ 3.18	$ 3.16	$ 3.14	$ 3.18	$ 3.19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 899.97	$ 902.12	$ 898.77	$ 890.67	$ 899.95	$ 900.92	$ 892.86	$ 889.45	$ 899.95	$ 902.12
Annual savings in GHG from electricity savings [kg CO2e/year]	70	70.1	69.9	69.2	70	70	69.4	69.1	70	70.1
Annual savings in natural gas [m3/year]	390.17	393.16	388.49	377.24	391.66	391.49	380.28	375.54	392.65	394.66
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,614.91	$ 3,642.66	$ 3,599.37	$ 3,495.12	$ 3,628.75	$ 3,627.16	$ 3,523.25	$ 3,479.41	$ 3,637.93	$ 3,656.5
Annual savings in carbon tax for natural gas [$/year]	$ 902.26	$ 909.19	$ 898.39	$ 872.37	$ 905.72	$ 905.32	$ 879.39	$ 868.45	$ 908.01	$ 912.65
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,517.17	$ 4,551.85	$ 4,497.76	$ 4,367.49	$ 4,534.47	$ 4,532.48	$ 4,402.64	$ 4,347.86	$ 4,545.94	$ 4,569.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	20050.3	20204.2	19964.1	19385.9	20127.1	20118.3	19541.9	19298.8	20178	20281
Net Present Value [$]	$ 66,566.86	$ 66,446.96	$ 66,446.93	$ 66,422.78	$ 66,352.31	$ 66,328.01	$ 66,313.02	$ 66,298.55	$ 66,275.06	$ 66,232.78
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	5.28	7.04	7.04	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 13,865.16	$ 16,797.	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 5,386.91	$ 6,219.22	$ 5,386.91	$ 5,386.91	$ 5,386.91	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 5,386.91	$ 6,219.22
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	5.64	6.34	6.34	5.64	6.34	5.64	6.34	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 295.47	$ 574.53	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$ 850.	$ 550.

ROWHOUSE Fort Nelson: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 33,284.64	$ 33,445.58	$ 33,724.64	$ 33,830.45	$ 33,834.64	$ 33,945.58	$ 33,995.58	$ 34,125.92	$ 34,134.64	$ 34,224.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 49,993.53	$ 50,235.26	$ 50,654.41	$ 50,813.34	$ 50,819.63	$ 50,986.26	$ 51,061.36	$ 51,257.13	$ 51,270.23	$ 51,405.41
Net Present Value [$]	$ 17,432.19	$ 17,121.16	$ 17,474.39	$ 16,726.8	$ 17,279.16	$ 16,791.15	$ 16,968.13	$ 17,578.33	$ 17,243.15	$ 17,144.38
Incremental dollars per GHG saving	$ 1.19	$ 1.19	$ 1.2	$ 1.21	$ 1.2	$ 1.21	$ 1.21	$ 1.22	$ 1.21	$ 1.22
Auxiliary Energy Required Heating [GJ/yr]	207.9	208.2	206.6	208.1	207.9	207.7	208.2	205.1	207.9	206
Annual Energy DHW [GJ/yr]	117.3	117.3	117.3	117.3	115.6	117.3	115.6	117.3	114.4	117.3
Annual Energy Space Heating [GJ/yr]	122.4	122.6	121.7	122.6	122.4	122.4	122.6	121	122.4	121.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	401.6	401.8	400.9	401.8	399.8	401.6	400	400.2	398.6	400.7
Design Heating Load [W]	35351.8	35382.2	35167.4	35439.7	35351.8	35342.7	35382.2	35040	35351.8	35127.9
Annual Energy Electricity [kWh/yr]	78960.5	79018.8	78753.2	79022.5	78960.5	78952.8	79018.8	78577	78960.5	78707.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,109.6	$ 11,117.85	$ 11,083.09	$ 11,118.37	$ 11,109.6	$ 11,108.51	$ 11,117.85	$ 11,055.33	$ 11,109.6	$ 11,073.75
Annual Energy Natural Gas [m3/yr]	3150.6	3150.6	3150.6	3150.6	3103.2	3150.6	3103.2	3150.6	3071.7	3150.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,359.06	$ 1,359.06	$ 1,359.06	$ 1,359.06	$ 1,338.61	$ 1,359.06	$ 1,338.61	$ 1,359.06	$ 1,325.02	$ 1,359.06
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	19072	18442	19090	17992	19073	18460	18443	18640	19074	19108
Upgrade Package List	Pkg3200231032	Pkg3200221033	Pkg3200231033	Pkg3200212032	Pkg3200231032	Pkg3200221034	Pkg3200221033	Pkg3200222032	Pkg3200231032	Pkg3200231034
GHGI [kg/m2]	6.8	6.8	6.79	6.8	6.71	6.8	6.71	6.79	6.65	6.79
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	56.9	57	56.5	56.9	56.9	56.8	57	56.1	56.9	56.4
Output: MEUI [kWh/(m2 * yr)]	67.5	67.6	67.3	67.6	67	67.5	67.1	67.1	66.7	67.3
Output: Better than ERS (%)	1560.0%	1550.0%	1570.0%	1550.0%	1600.0%	1560.0%	1590.0%	1590.0%	1620.0%	1580.0%
Output: Better than Envelope (%)	4210.0%	4200.0%	4250.0%	4200.0%	4210.0%	4210.0%	4200.0%	4290.0%	4210.0%	4260.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28530	28588	28342	28592	28530	28522	28588	28146	28530	28276
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,022.69	$ 4,030.91	$ 3,996.28	$ 4,031.43	$ 4,022.69	$ 4,021.6	$ 4,030.91	$ 3,968.61	$ 4,022.69	$ 3,986.97
Annual savings in carbon tax for electricity [$/year]	$ 14.26	$ 14.29	$ 14.17	$ 14.3	$ 14.26	$ 14.26	$ 14.29	$ 14.07	$ 14.26	$ 14.14
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,036.95	$ 4,045.2	$ 4,010.45	$ 4,045.73	$ 4,036.95	$ 4,035.86	$ 4,045.2	$ 3,982.69	$ 4,036.95	$ 4,001.11
Annual savings in GHG from electricity savings [kg CO2e/year]	313.8	314.5	311.8	314.5	313.8	313.7	314.5	309.6	313.8	311
Annual savings in natural gas [m3/year]	552.31	552.31	552.31	552.31	554.07	552.31	554.07	552.31	555.25	552.31
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 5,117.13	$ 5,117.13	$ 5,117.13	$ 5,117.13	$ 5,133.49	$ 5,117.13	$ 5,133.49	$ 5,117.13	$ 5,144.37	$ 5,117.13
Annual savings in carbon tax for natural gas [$/year]	$ 1,277.21	$ 1,277.21	$ 1,277.21	$ 1,277.21	$ 1,281.3	$ 1,277.21	$ 1,281.3	$ 1,277.21	$ 1,284.01	$ 1,277.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 6,394.34	$ 6,394.34	$ 6,394.34	$ 6,394.34	$ 6,414.79	$ 6,394.34	$ 6,414.79	$ 6,394.34	$ 6,428.38	$ 6,394.34
Annual savings in GHG from natural gas savings [kg CO2e/year]	28382.5	28382.5	28382.5	28382.5	28473.2	28382.5	28473.2	28382.5	28533.5	28382.5
Net Present Value [$]	$ 17,432.19	$ 17,121.16	$ 17,474.39	$ 16,726.8	$ 17,279.16	$ 16,791.15	$ 16,968.13	$ 17,578.33	$ 17,243.15	$ 17,144.38
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	11.2	9.02	9.02	9.02	11.2	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	NA	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	5.64	6.34	4.67	6.34	5.64	5.64	5.64	6.34	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 295.47	$ 574.53	$.	$ 574.53	$ 295.47	$ 295.47	$ 295.47	$ 574.53	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 85
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	NA	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,360.	$ 2,300.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$ 550.	$.	$ 850.	$.

ROWHOUSE Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 34,324.64	$ 34,545.58	$ 34,725.92	$ 33,284.64	$ 34,874.64	$ 34,824.64	$ 34,870.45	$ 34,900.29	$ 33,445.58	$ 35,004.98
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 51,555.61	$ 51,887.46	$ 52,158.33	$ 49,993.53	$ 52,381.71	$ 52,306.61	$ 52,375.42	$ 52,420.24	$ 50,235.26	$ 52,577.48
Net Present Value [$]	$ 22,104.19	$ 21,420.94	$ 22,210.31	$ 17,432.19	$ 21,888.3	$ 21,774.36	$ 21,401.54	$ 21,421.	$ 17,121.16	$ 22,555.33
Incremental dollars per GHG saving	$ 1.17	$ 1.18	$ 1.19	$ 1.19	$ 1.19	$ 1.19	$ 1.19	$ 1.19	$ 1.19	$ 1.2
Auxiliary Energy Required Heating [GJ/yr]	207.7	208.8	206.2	207.9	207.7	207.1	207.9	207.5	208.2	204.6
Annual Energy DHW [GJ/yr]	93.6	93.6	93.6	117.3	92.1	93.6	93.6	93.6	117.3	93.6
Annual Energy Space Heating [GJ/yr]	122	122.6	121.3	122.4	122	121.7	122.2	122	122.6	120.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	377.4	378	376.7	401.6	375.9	377.1	377.6	377.5	401.8	375.8
Design Heating Load [W]	34750.7	34926	34623.3	35351.8	34750.7	34711.1	34838.5	34939	35382.2	34408.5
Annual Energy Electricity [kWh/yr]	78810.8	78990.4	78613.7	78960.5	78812.8	78744.7	78871.7	78852.6	79018.8	78371.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,088.41	$ 11,113.83	$ 11,060.52	$ 11,109.6	$ 11,088.7	$ 11,079.06	$ 11,097.03	$ 11,094.33	$ 11,117.85	$ 11,026.22
Annual Energy Natural Gas [m3/yr]	2514.7	2514.7	2514.7	3150.6	2474.2	2514.7	2514.7	2514.7	3150.6	2514.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,084.75	$ 1,084.75	$ 1,084.75	$ 1,359.06	$ 1,067.28	$ 1,084.75	$ 1,084.75	$ 1,084.75	$ 1,359.06	$ 1,084.75
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	19093	18463	18643	19072	19094	19111	18013	20371	18442	19291
Upgrade Package List	Pkg3200231033	Pkg3200231034	Pkg3200222032	Pkg3200231032	Pkg3200231033	Pkg3200231034	Pkg3200232033	Pkg3200321032	Pkg3200221033	Pkg3200232032
GHGI [kg/m2]	5.6	5.6	5.59	6.8	5.52	5.59	5.6	5.6	6.8	5.59
% ICC	1.6%	1.6%	1.6%	1.5%	1.6%	1.6%	1.6%	1.6%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	56.8	57.1	56.4	56.9	56.8	56.7	56.9	56.8	57	56
Output: MEUI [kWh/(m2 * yr)]	60.9	61.1	60.7	67.5	60.5	60.8	60.9	60.9	67.6	60.5
Output: Better than ERS (%)	1970.0%	1950.0%	1980.0%	1560.0%	2000.0%	1970.0%	1960.0%	1960.0%	1550.0%	2000.0%
Output: Better than Envelope (%)	4210.0%	4180.0%	4260.0%	4210.0%	4210.0%	4230.0%	4210.0%	4220.0%	4200.0%	4300.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	28380	28560	28183	28530	28382	28314	28441	28422	28588	27940
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,001.58	$ 4,026.9	$ 3,973.79	$ 4,022.69	$ 4,001.86	$ 3,992.26	$ 4,010.17	$ 4,007.47	$ 4,030.91	$ 3,939.61
Annual savings in carbon tax for electricity [$/year]	$ 14.19	$ 14.28	$ 14.09	$ 14.26	$ 14.19	$ 14.16	$ 14.22	$ 14.21	$ 14.29	$ 13.97
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,015.77	$ 4,041.18	$ 3,987.88	$ 4,036.95	$ 4,016.05	$ 4,006.42	$ 4,024.39	$ 4,021.68	$ 4,045.2	$ 3,953.58
Annual savings in GHG from electricity savings [kg CO2e/year]	312.2	314.2	310	313.8	312.2	311.5	312.8	312.6	314.5	307.3
Annual savings in natural gas [m3/year]	576	576	576	552.31	577.51	576	576	576	552.31	576
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 5,336.65	$ 5,336.65	$ 5,336.65	$ 5,117.13	$ 5,350.63	$ 5,336.65	$ 5,336.65	$ 5,336.65	$ 5,117.13	$ 5,336.65
Annual savings in carbon tax for natural gas [$/year]	$ 1,332.	$ 1,332.	$ 1,332.	$ 1,277.21	$ 1,335.49	$ 1,332.	$ 1,332.	$ 1,332.	$ 1,277.21	$ 1,332.
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 6,668.65	$ 6,668.65	$ 6,668.65	$ 6,394.34	$ 6,686.12	$ 6,668.65	$ 6,668.65	$ 6,668.65	$ 6,394.34	$ 6,668.65
Annual savings in GHG from natural gas savings [kg CO2e/year]	29600	29600	29600	28382.5	29677.6	29600	29600	29600	28382.5	29600
Net Present Value [$]	$ 22,104.19	$ 21,420.94	$ 22,210.31	$ 17,432.19	$ 21,888.3	$ 21,774.36	$ 21,401.54	$ 21,421.	$ 17,121.16	$ 22,555.33
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	11.2	9.02	9.02	9.02	11.2	9.02	9.02	11.2
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 4,092.2	$ 5,386.91	$ 4,092.2	$ 4,092.2
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	NA	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36
Exposed Floor RSI	6.34	5.64	5.64	6.34	6.34	6.34	4.67	5.64	5.64	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 295.47	$ 295.47	$ 574.53	$ 574.53	$ 574.53	$.	$ 295.47	$ 295.47	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

ROWHOUSE Fort Nelson: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 72,271.44	$ 72,571.44	$ 72,771.44	$ 73,071.44	$ 72,792.38	$ 41,503.84	$ 87,848.95	$ 40,671.53	$ 88,148.95	$ 42,053.84
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 108,551.7	$ 109,002.3	$ 109,302.7	$ 109,753.3	$ 109,334.15	$ 62,338.77	$ 131,949.12	$ 61,088.64	$ 132,399.72	$ 63,164.87
Net Present Value [$]	$ 42,734.71	$ 42,657.28	$ 42,364.86	$ 42,287.42	$ 42,186.55	$ 27,469.67	$ 27,396.5	$ 27,369.52	$ 27,319.24	$ 27,254.15
Incremental dollars per GHG saving	$ 3.21	$ 3.22	$ 3.23	$ 3.24	$ 3.24	$ 1.42	$ 3.9	$ 1.39	$ 3.9	$ 1.43
Auxiliary Energy Required Heating [GJ/yr]	135.8	135.8	135.3	135.3	136.9	175.7	134.9	178.6	134.9	175.7
Annual Energy DHW [GJ/yr]	92.1	91.1	92.1	91.1	91.1	93.6	92.1	93.6	91.1	92.1
Annual Energy Space Heating [GJ/yr]	143.9	143.9	143.3	143.3	145	104.3	142.9	105.7	142.9	104.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	391.3	390.3	390.7	389.7	391.4	359.8	390.2	361.1	389.3	358.3
Design Heating Load [W]	25082.9	25082.9	25043.4	25043.4	25258.2	30303	23414.5	30505	23414.5	30303
Annual Energy Electricity [kWh/yr]	43844.7	43844.8	43841.9	43842	43850.1	73938	43839.6	74300.2	43839.6	73939.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,140.71	$ 6,140.72	$ 6,140.31	$ 6,140.33	$ 6,141.47	$ 10,398.91	$ 6,139.99	$ 10,450.16	$ 6,139.99	$ 10,399.18
Annual Energy Natural Gas [m3/yr]	6268.3	6241.7	6253.6	6227	6269.9	2514.7	6241.3	2514.7	6214.7	2474.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 2,703.93	$ 2,692.45	$ 2,697.59	$ 2,686.11	$ 2,704.62	$ 1,084.75	$ 2,692.28	$ 1,084.75	$ 2,680.8	$ 1,067.28
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	32819	32820	32837	32838	32550	32611	32711	31747	32712	32612
Upgrade Package List	Pkg4300433053	Pkg4300433053	Pkg4300433054	Pkg4300433054	Pkg4300423054	Pkg4300432033	Pkg4300432063	Pkg4300332033	Pkg4300432063	Pkg4300432033
GHGI [kg/m2]	12.29	12.24	12.27	12.22	12.3	5.54	12.24	5.55	12.19	5.47
% ICC	3.3%	3.3%	3.3%	3.3%	3.3%	1.9%	4.0%	1.8%	4.0%	1.9%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	37.2	37.2	37	37	37.4	48.1	36.9	48.8	36.9	48.1
Output: MEUI [kWh/(m2 * yr)]	65	64.7	64.8	64.6	65	56.1	64.7	56.4	64.4	55.7
Output: Better than ERS (%)	2010.0%	2030.0%	2020.0%	2040.0%	2010.0%	2340.0%	2030.0%	2310.0%	2050.0%	2370.0%
Output: Better than Envelope (%)	6220.0%	6220.0%	6230.0%	6230.0%	6190.0%	5110.0%	6240.0%	5030.0%	6240.0%	5110.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6586	6586	6589	6589	6581	23507	6591	23869	6591	23509
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 928.64	$ 928.63	$ 929.03	$ 929.02	$ 927.88	$ 3,314.52	$ 929.36	$ 3,365.59	$ 929.36	$ 3,314.78
Annual savings in carbon tax for electricity [$/year]	$ 3.29	$ 3.29	$ 3.29	$ 3.29	$ 3.29	$ 11.75	$ 3.3	$ 11.93	$ 3.3	$ 11.75
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 931.93	$ 931.92	$ 932.33	$ 932.32	$ 931.17	$ 3,326.27	$ 932.65	$ 3,377.52	$ 932.65	$ 3,326.54
Annual savings in GHG from electricity savings [kg CO2e/year]	72.4	72.4	72.5	72.5	72.4	258.6	72.5	262.6	72.5	258.6
Annual savings in natural gas [m3/year]	436.15	437.14	436.69	437.68	436.09	576	437.15	576	438.14	577.51
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,040.89	$ 4,050.07	$ 4,045.96	$ 4,055.14	$ 4,040.34	$ 5,336.65	$ 4,050.21	$ 5,336.65	$ 4,059.39	$ 5,350.63
Annual savings in carbon tax for natural gas [$/year]	$ 1,008.59	$ 1,010.88	$ 1,009.85	$ 1,012.14	$ 1,008.45	$ 1,332.	$ 1,010.91	$ 1,332.	$ 1,013.2	$ 1,335.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,049.47	$ 5,060.95	$ 5,055.82	$ 5,067.29	$ 5,048.78	$ 6,668.65	$ 5,061.12	$ 6,668.65	$ 5,072.6	$ 6,686.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	22413	22464	22441.2	22492.1	22410	29600	22464.7	29600	22515.7	29677.6
Net Present Value [$]	$ 42,734.71	$ 42,657.28	$ 42,364.86	$ 42,287.42	$ 42,186.55	$ 27,469.67	$ 27,396.5	$ 27,369.52	$ 27,319.24	$ 27,254.15
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	11.2	11.2	11.2	11.2	11.2
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 5,903.32	$ 5,903.32	$ 5,903.32	$ 5,903.32	$ 5,903.32	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 40 SHGC0 35	USI0 80 SHGC0 25	USI1 40 SHGC0 35	USI0 80 SHGC0 25	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 37,077.37	$ 37,077.37	$ 37,077.37	$ 37,077.37	$ 37,077.37	$ 6,941.51	$ 55,886.62	$ 6,941.51	$ 55,886.62	$ 6,941.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 6,219.22	$ 6,219.22
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	5.64	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP	NBC gas furnace	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 55	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$ 3,150.	$.	$ 3,150.	$.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 2,300.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 550.	$ 850.	$ 550.	$ 850.	$ 850.	$.	$ 550.	$.	$ 850.	$ 550.

ROWHOUSE Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 15,418.64	$ 15,418.64	$ 15,442.64	$ 15,552.64	$ 15,852.64	$ 15,852.64	$ 15,968.64	$ 15,968.64	$ 15,992.64	$ 15,992.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 23,158.8	$ 23,158.8	$ 23,194.85	$ 23,360.07	$ 23,810.67	$ 23,810.67	$ 23,984.9	$ 23,984.9	$ 24,020.95	$ 24,020.95
Net Present Value [$]	$ 41,218.5	$ 41,844.22	$ 43,463.31	$ 43,659.51	$ 43,828.52	$ 43,458.12	$ 41,357.94	$ 41,983.66	$ 43,617.53	$ 43,240.02
Incremental dollars per GHG saving	$ .47	$ .47	$ .86	$ .87	$ .88	$ .89	$ .49	$ .49	$ .89	$ .89
Auxiliary Energy Required Heating [GJ/yr]	402.1	403.6	400.3	401.4	401	402.5	402.1	403.6	399.8	401.3
Annual Energy DHW [GJ/yr]	119.1	119.1	48.8	48	47.5	47.5	117.2	117.2	48	48
Annual Energy Space Heating [GJ/yr]	261	261.9	424	425	424.6	426.2	261	261.9	423.3	425
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	1.5	1.5	1.5	1.5	6.2	6.2	1.5	1.5
Total Energy [GJ/yr]	542.7	543.6	628	628.3	627.4	629	540.9	541.8	626.6	628.3
Design Heating Load [W]	48276.5	48447.4	45413.4	45606.9	45606.9	45777.8	48276.5	48447.4	45413.4	45584.3
Annual Energy Electricity [kWh/yr]	117679.8	117922.9	58805.4	58592.8	58445.5	58453.4	117679.8	117922.9	58584.3	58592.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 16,588.38	$ 16,622.78	$ 8,257.65	$ 8,227.57	$ 8,206.72	$ 8,207.84	$ 16,588.38	$ 16,622.78	$ 8,226.36	$ 8,227.51
Annual Energy Natural Gas [m3/yr]	3197.4	3197.4	11179.9	11208.7	11198	11239.8	3148.4	3148.4	11163.8	11206.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,379.25	$ 1,379.25	$ 4,822.62	$ 4,835.04	$ 4,830.43	$ 4,848.46	$ 1,358.11	$ 1,358.11	$ 4,815.67	$ 4,834.05
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32950	33490	32983	32966	32967	33507	32951	33491	32984	33524
Upgrade Package List	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100101012	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100111013
GHGI [kg/m2]	7.3	7.31	21.72	21.77	21.75	21.83	7.21	7.21	21.69	21.77
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	110	110.4	109.5	109.8	109.7	110.1	110	110.4	109.4	109.8
Output: MEUI [kWh/(m2 * yr)]	106.3	106.5	129.8	129.8	129.6	130	105.8	106	129.4	129.8
Output: Better than ERS (%)	30.0%	10.0%	1120.0%	1120.0%	1110.0%	1130.0%	60.0%	40.0%	1090.0%	1120.0%
Output: Better than Envelope (%)	440.0%	400.0%	480.0%	450.0%	460.0%	430.0%	440.0%	400.0%	490.0%	460.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	66756	66999	7881	7668	7521	7529	66756	66999	7660	7668
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,412.53	$ 9,446.8	$ 1,111.24	$ 1,081.26	$ 1,060.49	$ 1,061.6	$ 9,412.53	$ 9,446.8	$ 1,080.06	$ 1,081.2
Annual savings in carbon tax for electricity [$/year]	$ 33.38	$ 33.5	$ 3.94	$ 3.83	$ 3.76	$ 3.76	$ 33.38	$ 33.5	$ 3.83	$ 3.83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,445.9	$ 9,480.3	$ 1,115.18	$ 1,085.09	$ 1,064.25	$ 1,065.37	$ 9,445.9	$ 9,480.3	$ 1,083.89	$ 1,085.04
Annual savings in GHG from electricity savings [kg CO2e/year]	734.3	737	86.7	84.4	82.7	82.8	734.3	737	84.3	84.3
Annual savings in natural gas [m3/year]	649.69	649.69	352.28	351.2	351.6	350.04	651.52	651.52	352.88	351.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,019.42	$ 6,019.42	$ 3,263.83	$ 3,253.89	$ 3,257.59	$ 3,243.16	$ 6,036.34	$ 6,036.34	$ 3,269.39	$ 3,254.69
Annual savings in carbon tax for natural gas [$/year]	$ 1,502.42	$ 1,502.42	$ 814.64	$ 812.16	$ 813.08	$ 809.48	$ 1,506.64	$ 1,506.64	$ 816.02	$ 812.35
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,521.84	$ 7,521.84	$ 4,078.47	$ 4,066.05	$ 4,070.66	$ 4,052.63	$ 7,542.98	$ 7,542.98	$ 4,085.42	$ 4,067.04
Annual savings in GHG from natural gas savings [kg CO2e/year]	33387.1	33387.1	18103.1	18047.9	18068.4	17988.4	33480.9	33480.9	18133.9	18052.3
Net Present Value [$]	$ 41,218.5	$ 41,844.22	$ 43,463.31	$ 43,659.51	$ 43,828.52	$ 43,458.12	$ 41,357.94	$ 41,983.66	$ 43,617.53	$ 43,240.02
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	5.02	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	BC CCASHP	BC CCASHP	NBC gas furnace	NBC gas furnace
Ventilation System Code	NA	NA	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$.	$.	$.	$.	$ 3,150.	$ 3,150.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$.	$.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$.	$.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.	$ 550.	$ 550.

ROWHOUSE Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 18,152.64	$ 18,152.64	$ 15,418.64	$ 15,418.64	$ 16,018.64	$ 16,018.64	$ 18,592.64	$ 18,592.64	$ 18,702.64	$ 18,702.64
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,265.27	$ 27,265.27	$ 23,158.8	$ 23,158.8	$ 24,060.	$ 24,060.	$ 27,926.15	$ 27,926.15	$ 28,091.37	$ 28,091.37
Net Present Value [$]	$ 45,014.78	$ 45,649.27	$ 41,218.5	$ 41,844.22	$ 36,178.38	$ 36,809.94	$ 44,808.07	$ 45,438.17	$ 44,807.97	$ 45,442.27
Incremental dollars per GHG saving	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .48	$ .48	$ .48	$ .48
Auxiliary Energy Required Heating [GJ/yr]	401.9	403.4	402.1	403.6	402.9	404.4	400.3	401.8	401.4	402.9
Annual Energy DHW [GJ/yr]	48.8	48.8	119.1	119.1	95.1	95.1	48.8	48.8	48	48
Annual Energy Space Heating [GJ/yr]	256.9	257.8	261	261.9	260.8	261.7	256	256.9	256.6	257.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	6.2	6.2	6.2	6.2	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	462.6	463.5	542.7	543.6	518.4	519.3	461.7	462.6	461.5	462.4
Design Heating Load [W]	47516.2	47687.1	48276.5	48447.4	47770.8	47941.7	47322.7	47493.6	47516.2	47687.1
Annual Energy Electricity [kWh/yr]	128495.6	128742	117679.8	117922.9	117580.2	117825.5	128244.4	128489.1	128201.6	128448
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 18,118.81	$ 18,153.68	$ 16,588.38	$ 16,622.78	$ 16,574.28	$ 16,608.99	$ 18,083.27	$ 18,117.89	$ 18,077.21	$ 18,112.08
Annual Energy Natural Gas [m3/yr]	0	0	3197.4	3197.4	2554.7	2554.7	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$ 1,379.25	$ 1,379.25	$ 1,102.01	$ 1,102.01	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	32974	33514	32950	33490	32953	33493	32992	33532	32975	33515
Upgrade Package List	Pkg2100101012	Pkg2100111012	Pkg2100101011	Pkg2100111011	Pkg2100101011	Pkg2100111011	Pkg2100101013	Pkg2100111013	Pkg2100101012	Pkg2100111012
GHGI [kg/m2]	1.39	1.39	7.3	7.31	6.09	6.09	1.39	1.39	1.39	1.39
% ICC	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	110	110.4	110	110.4	110.2	110.6	109.5	109.9	109.8	110.2
Output: MEUI [kWh/(m2 * yr)]	84.4	84.7	106.3	106.5	99.7	99.9	84.2	84.4	84.1	84.4
Output: Better than ERS (%)	1430.0%	1420.0%	30.0%	10.0%	360.0%	340.0%	1450.0%	1430.0%	1450.0%	1440.0%
Output: Better than Envelope (%)	440.0%	410.0%	440.0%	400.0%	420.0%	380.0%	480.0%	440.0%	450.0%	420.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	77571	77818	66756	66999	66656	66901	77320	77565	77277	77524
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 10,937.55	$ 10,972.3	$ 9,412.53	$ 9,446.8	$ 9,398.48	$ 9,433.07	$ 10,902.13	$ 10,936.64	$ 10,896.1	$ 10,930.84
Annual savings in carbon tax for electricity [$/year]	$ 38.79	$ 38.91	$ 33.38	$ 33.5	$ 33.33	$ 33.45	$ 38.66	$ 38.78	$ 38.64	$ 38.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 10,976.34	$ 11,011.2	$ 9,445.9	$ 9,480.3	$ 9,431.81	$ 9,466.52	$ 10,940.79	$ 10,975.42	$ 10,934.74	$ 10,969.6
Annual savings in GHG from electricity savings [kg CO2e/year]	853.3	856	734.3	737	733.2	735.9	850.5	853.2	850.1	852.8
Annual savings in natural gas [m3/year]	768.83	768.83	649.69	649.69	673.64	673.64	768.83	768.83	768.83	768.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 7,123.18	$ 7,123.18	$ 6,019.42	$ 6,019.42	$ 6,241.29	$ 6,241.29	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18
Annual savings in carbon tax for natural gas [$/year]	$ 1,777.91	$ 1,777.91	$ 1,502.42	$ 1,502.42	$ 1,557.8	$ 1,557.8	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 8,901.09	$ 8,901.09	$ 7,521.84	$ 7,521.84	$ 7,799.08	$ 7,799.08	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	39509.1	39509.1	33387.1	33387.1	34617.7	34617.7	39509.1	39509.1	39509.1	39509.1
Net Present Value [$]	$ 45,014.78	$ 45,649.27	$ 41,218.5	$ 41,844.22	$ 36,178.38	$ 36,809.94	$ 44,808.07	$ 45,438.17	$ 44,807.97	$ 45,442.27
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	NA	NA	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$.	$.	$.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$.	$.	$ 600.	$ 600.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 550.	$ 550.

ROWHOUSE Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55
Total increase in construction cost [$]	$ 26,688.25	$ 27,128.25	$ 25,567.91	$ 26,007.91	$ 27,238.25	$ 27,538.25	$ 27,678.25	$ 26,117.91	$ 26,688.25	$ 27,978.25
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 40,085.75	$ 40,746.63	$ 38,403.	$ 39,063.88	$ 40,911.85	$ 41,362.45	$ 41,572.73	$ 39,229.1	$ 40,085.75	$ 42,023.33
Net Present Value [$]	$ 78,201.78	$ 78,120.9	$ 78,101.57	$ 78,024.09	$ 77,997.61	$ 77,927.88	$ 77,916.55	$ 77,897.4	$ 77,856.37	$ 77,846.64
Incremental dollars per GHG saving	$ 1.32	$ 1.33	$ 1.28	$ 1.29	$ 1.34	$ 1.35	$ 1.35	$ 1.3	$ 1.32	$ 1.36
Auxiliary Energy Required Heating [GJ/yr]	269.1	267.7	274.1	272.6	269.2	269.2	267.7	274.1	270.5	267.7
Annual Energy DHW [GJ/yr]	95.1	95.1	95.1	95.1	93.6	92.5	93.6	93.6	95.1	92.5
Annual Energy Space Heating [GJ/yr]	285.1	283.5	290.3	288.7	285.1	285.1	283.5	290.3	286.5	283.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	535.4	533.9	540.7	539.1	533.9	532.9	532.4	539.1	536.9	531.3
Design Heating Load [W]	37995.3	37801.8	38547.9	38354.4	37995.3	37995.3	37801.8	38547.9	38166.3	37801.8
Annual Energy Electricity [kWh/yr]	44549.4	44541.7	44575.4	44567.7	44549.5	44549.5	44541.8	44575.5	44556.7	44541.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,240.43	$ 6,239.34	$ 6,244.1	$ 6,243.01	$ 6,240.44	$ 6,240.44	$ 6,239.35	$ 6,244.12	$ 6,241.46	$ 6,239.36
Annual Energy Natural Gas [m3/yr]	10071.7	10031.2	10209.4	10168.5	10030.4	10002.9	9989.9	10168.1	10110.7	9962.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 4,344.58	$ 4,327.11	$ 4,403.98	$ 4,386.34	$ 4,326.76	$ 4,314.9	$ 4,309.29	$ 4,386.16	$ 4,361.4	$ 4,297.43
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	36580	36598	36310	36328	36581	36582	36599	36311	37120	36600
Upgrade Package List	Pkg2200102032	Pkg2200102033	Pkg2200101032	Pkg2200101033	Pkg2200102032	Pkg2200102032	Pkg2200102033	Pkg2200101032	Pkg2200112032	Pkg2200102033
GHGI [kg/m2]	19.47	19.4	19.73	19.66	19.4	19.34	19.32	19.66	19.55	19.27
% ICC	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.2%	1.2%	1.3%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	73.6	73.2	75	74.6	73.6	73.6	73.2	75	74	73.2
Output: MEUI [kWh/(m2 * yr)]	104.4	104	105.9	105.4	104	103.7	103.6	105.4	104.8	103.3
Output: Better than ERS (%)	480.0%	510.0%	390.0%	410.0%	510.0%	520.0%	530.0%	410.0%	450.0%	550.0%
Output: Better than Envelope (%)	3600.0%	3630.0%	3480.0%	3520.0%	3600.0%	3600.0%	3630.0%	3480.0%	3570.0%	3630.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6375	6383	6349	6357	6375	6375	6382	6349	6368	6382
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 898.86	$ 899.95	$ 895.19	$ 896.28	$ 898.85	$ 898.85	$ 899.93	$ 895.18	$ 897.83	$ 899.92
Annual savings in carbon tax for electricity [$/year]	$ 3.19	$ 3.19	$ 3.17	$ 3.18	$ 3.19	$ 3.19	$ 3.19	$ 3.17	$ 3.18	$ 3.19
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 902.05	$ 903.14	$ 898.37	$ 899.46	$ 902.03	$ 902.03	$ 903.12	$ 898.36	$ 901.02	$ 903.11
Annual savings in GHG from electricity savings [kg CO2e/year]	70.1	70.2	69.8	69.9	70.1	70.1	70.2	69.8	70	70.2
Annual savings in natural gas [m3/year]	393.57	395.07	388.44	389.96	395.1	396.13	396.61	389.97	392.11	397.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 3,646.39	$ 3,660.37	$ 3,598.85	$ 3,612.97	$ 3,660.65	$ 3,670.14	$ 3,674.63	$ 3,613.11	$ 3,632.93	$ 3,684.12
Annual savings in carbon tax for natural gas [$/year]	$ 910.12	$ 913.61	$ 898.26	$ 901.78	$ 913.68	$ 916.05	$ 917.17	$ 901.82	$ 906.76	$ 919.54
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 4,556.51	$ 4,573.98	$ 4,497.11	$ 4,514.75	$ 4,574.33	$ 4,586.19	$ 4,591.8	$ 4,514.93	$ 4,539.69	$ 4,603.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	20224.9	20302.5	19961.3	20039.6	20304	20356.6	20381.5	20040.3	20150.2	20434.2
Net Present Value [$]	$ 78,201.78	$ 78,120.9	$ 78,101.57	$ 78,024.09	$ 77,997.61	$ 77,927.88	$ 77,916.55	$ 77,897.4	$ 77,856.37	$ 77,846.64
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	9.02	9.02	11.2	11.2	11.2	9.02	11.2	11.2
Attic Ceiling Code	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]
Exposed Floor RSI	5.02	5.02	5.02	5.02	5.02	5.02	5.02	5.02	4.67	5.02
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 55	DWHR eff 30	DWHR eff 30	NA	DWHR eff 55
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 850.	$ 550.	$ 550.	$.	$ 850.

ROWHOUSE Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 22,296.74	$ 22,360.15	$ 22,360.15	$ 22,736.74	$ 22,736.74	$ 22,846.74	$ 22,910.15	$ 22,910.15	$ 22,960.15	$ 22,960.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 33,489.7	$ 33,584.95	$ 33,584.95	$ 34,150.58	$ 34,150.58	$ 34,315.8	$ 34,411.05	$ 34,411.05	$ 34,486.15	$ 34,486.15
Net Present Value [$]	$ 16,594.85	$ 20,996.84	$ 21,609.6	$ 16,386.3	$ 17,018.78	$ 16,734.29	$ 21,136.28	$ 21,749.04	$ 15,949.24	$ 16,558.89
Incremental dollars per GHG saving	$ .68	$ .68	$ .68	$ .69	$ .69	$ .7	$ .7	$ .7	$ .68	$ .68
Auxiliary Energy Required Heating [GJ/yr]	336.6	331.4	332.8	335	336.5	336.6	331.4	332.8	331.9	333.4
Annual Energy DHW [GJ/yr]	119.1	119.1	119.1	119.1	119.1	117.2	117.2	117.2	95.1	95.1
Annual Energy Space Heating [GJ/yr]	221.9	221.6	222.4	220.9	221.8	221.9	221.6	222.4	221.3	222.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	6.2	6.2	1.5	1.5	1.5	6.2	6.2	6.2	6.2
Total Energy [GJ/yr]	498.7	504.7	505.6	497.8	498.6	496.8	502.9	503.8	480.4	481.3
Design Heating Load [W]	44760.8	43854.2	44025.1	44567.2	44738.1	44760.8	43854.2	44025.1	43348.6	43519.5
Annual Energy Electricity [kWh/yr]	105443.5	107128.8	107366.8	105191.6	105437.3	105443.5	107128.8	107366.8	107026.2	107263
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,856.94	$ 15,095.41	$ 15,129.09	$ 14,821.3	$ 14,856.06	$ 14,856.94	$ 15,095.41	$ 15,129.09	$ 15,080.89	$ 15,114.4
Annual Energy Natural Gas [m3/yr]	3197.4	3197.4	3197.4	3197.4	3197.4	3148.4	3148.4	3148.4	2554.7	2554.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,358.11	$ 1,358.11	$ 1,358.11	$ 1,102.01	$ 1,102.01
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	36478	33058	33598	36496	37036	36479	33059	33599	33061	33601
Upgrade Package List	Pkg2200102012	Pkg2100101031	Pkg2100111031	Pkg2200102013	Pkg2200112013	Pkg2200102012	Pkg2100101031	Pkg2100111031	Pkg2100101031	Pkg2100111031
GHGI [kg/m2]	7.17	7.19	7.19	7.17	7.17	7.08	7.1	7.1	5.98	5.98
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	92.1	90.6	91	91.7	92	92.1	90.6	91	90.8	91.2
Output: MEUI [kWh/(m2 * yr)]	94.3	95.8	96.1	94	94.3	93.8	95.3	95.6	89.2	89.4
Output: Better than ERS (%)	840.0%	730.0%	710.0%	850.0%	840.0%	870.0%	760.0%	740.0%	1060.0%	1050.0%
Output: Better than Envelope (%)	2000.0%	2120.0%	2090.0%	2030.0%	2000.0%	2000.0%	2120.0%	2090.0%	2110.0%	2070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	54519	56204	56442	54267	54513	54519	56204	56442	56102	56339
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,687.21	$ 7,924.83	$ 7,958.39	$ 7,651.69	$ 7,686.33	$ 7,687.21	$ 7,924.83	$ 7,958.39	$ 7,910.37	$ 7,943.76
Annual savings in carbon tax for electricity [$/year]	$ 27.26	$ 28.1	$ 28.22	$ 27.13	$ 27.26	$ 27.26	$ 28.1	$ 28.22	$ 28.05	$ 28.17
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,714.47	$ 7,952.94	$ 7,986.61	$ 7,678.82	$ 7,713.59	$ 7,714.47	$ 7,952.94	$ 7,986.61	$ 7,938.42	$ 7,971.93
Annual savings in GHG from electricity savings [kg CO2e/year]	599.7	618.2	620.9	596.9	599.6	599.7	618.2	620.9	617.1	619.7
Annual savings in natural gas [m3/year]	649.69	649.69	649.69	649.69	649.69	651.52	651.52	651.52	673.64	673.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,036.34	$ 6,036.34	$ 6,036.34	$ 6,241.29	$ 6,241.29
Annual savings in carbon tax for natural gas [$/year]	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,506.64	$ 1,506.64	$ 1,506.64	$ 1,557.8	$ 1,557.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,542.98	$ 7,542.98	$ 7,542.98	$ 7,799.08	$ 7,799.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	33387.1	33387.1	33387.1	33387.1	33387.1	33480.9	33480.9	33480.9	34617.7	34617.7
Net Present Value [$]	$ 16,594.85	$ 20,996.84	$ 21,609.6	$ 16,386.3	$ 17,018.78	$ 16,734.29	$ 21,136.28	$ 21,749.04	$ 15,949.24	$ 16,558.89
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	9.02	9.02	11.2	11.2	11.2	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	NA	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$.	$ 6,941.51	$ 6,941.51	$.	$.	$.	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	3.87	3.87	5.28	5.28	5.28	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 9,467.4	$ 9,467.4	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	5.02	4.67	5.02	4.67	5.02	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	NA	NA	HRV sre 75	HRV sre 75	HRV sre 60	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 30	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$.	$.	$ 1,800.	$ 1,800.	$ 1,360.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$ 550.	$ 550.	$ 550.	$.	$.

ROWHOUSE Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 55	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>elec heatpump ef1.90 Opt DHWR=>DWHR eff 30
Total increase in construction cost [$]	$ 25,094.15	$ 25,094.15	$ 25,534.15	$ 25,534.15	$ 25,644.15	$ 25,644.15	$ 25,944.15	$ 25,944.15	$ 26,084.15	$ 26,084.15
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 37,691.41	$ 37,691.41	$ 38,352.29	$ 38,352.29	$ 38,517.51	$ 38,517.51	$ 38,968.11	$ 38,968.11	$ 39,178.39	$ 39,178.39
Net Present Value [$]	$ 24,338.12	$ 24,968.4	$ 24,147.65	$ 24,763.33	$ 24,145.91	$ 24,775.47	$ 23,951.11	$ 24,579.57	$ 23,954.9	$ 24,571.12
Incremental dollars per GHG saving	$ .65	$ .65	$ .66	$ .66	$ .66	$ .66	$ .67	$ .67	$ .67	$ .67
Auxiliary Energy Required Heating [GJ/yr]	329.6	331.1	328.1	329.6	329.1	330.6	328.8	330.2	327.6	329.1
Annual Energy DHW [GJ/yr]	48.8	48.8	48.8	48.8	48.1	48.1	47.5	47.5	48.1	48.1
Annual Energy Space Heating [GJ/yr]	216.9	217.8	216.1	216.9	216.7	217.6	216.5	217.4	215.8	216.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	424	424.8	423.1	423.9	422.9	423.8	422.2	423.1	422	422.9
Design Heating Load [W]	43093.9	43264.8	42900.4	43071.3	43093.9	43264.8	43093.9	43264.8	42900.4	43071.3
Annual Energy Electricity [kWh/yr]	117767.8	118012.6	117522.9	117762	117479.5	117724	117287.3	117531.4	117234.4	117473.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 16,600.83	$ 16,635.47	$ 16,566.18	$ 16,600.01	$ 16,560.03	$ 16,594.63	$ 16,532.84	$ 16,567.38	$ 16,525.35	$ 16,559.21
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	33082	33622	33100	33640	33083	33623	33084	33624	33101	33641
Upgrade Package List	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033	Pkg2100101032	Pkg2100111032	Pkg2100101032	Pkg2100111032	Pkg2100101033	Pkg2100111033
GHGI [kg/m2]	1.28	1.28	1.27	1.28	1.27	1.28	1.27	1.27	1.27	1.27
% ICC	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	90.2	90.6	89.8	90.2	90	90.4	89.9	90.3	89.6	90
Output: MEUI [kWh/(m2 * yr)]	73.8	74	73.6	73.8	73.5	73.8	73.3	73.6	73.3	73.5
Output: Better than ERS (%)	2150.0%	2130.0%	2160.0%	2150.0%	2170.0%	2150.0%	2180.0%	2160.0%	2180.0%	2170.0%
Output: Better than Envelope (%)	2160.0%	2130.0%	2200.0%	2160.0%	2170.0%	2140.0%	2180.0%	2150.0%	2210.0%	2170.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	66844	67088	66599	66838	66555	66800	66363	66607	66310	66549
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,424.93	$ 9,459.45	$ 9,390.4	$ 9,424.12	$ 9,384.28	$ 9,418.76	$ 9,357.18	$ 9,391.6	$ 9,349.72	$ 9,383.47
Annual savings in carbon tax for electricity [$/year]	$ 33.42	$ 33.54	$ 33.3	$ 33.42	$ 33.28	$ 33.4	$ 33.18	$ 33.3	$ 33.16	$ 33.27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,458.36	$ 9,492.99	$ 9,423.7	$ 9,457.53	$ 9,417.56	$ 9,452.16	$ 9,390.36	$ 9,424.9	$ 9,382.88	$ 9,416.74
Annual savings in GHG from electricity savings [kg CO2e/year]	735.3	738	732.6	735.2	732.1	734.8	730	732.7	729.4	732
Annual savings in natural gas [m3/year]	768.83	768.83	768.83	768.83	768.83	768.83	768.83	768.83	768.83	768.83
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18	$ 7,123.18
Annual savings in carbon tax for natural gas [$/year]	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91	$ 1,777.91
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09	$ 8,901.09
Annual savings in GHG from natural gas savings [kg CO2e/year]	39509.1	39509.1	39509.1	39509.1	39509.1	39509.1	39509.1	39509.1	39509.1	39509.1
Net Present Value [$]	$ 24,338.12	$ 24,968.4	$ 24,147.65	$ 24,763.33	$ 24,145.91	$ 24,775.47	$ 23,951.11	$ 24,579.57	$ 23,954.9	$ 24,571.12
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24	$ 1,551.24
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4	$ 9,467.4
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA	NBC 936 5.02 [RSI]	NA
Exposed Floor RSI	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67	5.02	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	DWHR eff 30	DWHR eff 55	DWHR eff 55	DWHR eff 30	DWHR eff 30
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,360.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.	$ 1,374.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$ 550.	$ 850.	$ 850.	$ 550.	$ 550.

ROWHOUSE Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30
Total increase in construction cost [$]	$ 37,521.53	$ 38,353.84	$ 37,242.47	$ 38,071.53	$ 38,074.78	$ 38,903.84	$ 38,371.53	$ 39,203.84	$ 38,021.53	$ 37,792.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,357.34	$ 57,607.47	$ 55,938.19	$ 57,183.44	$ 57,188.32	$ 58,433.57	$ 57,634.04	$ 58,884.17	$ 57,108.34	$ 56,764.29
Net Present Value [$]	$ 79,864.42	$ 79,838.63	$ 79,684.25	$ 79,660.98	$ 79,660.34	$ 79,634.28	$ 79,591.07	$ 79,565.34	$ 79,496.44	$ 79,479.66
Incremental dollars per GHG saving	$ 1.63	$ 1.66	$ 1.63	$ 1.65	$ 1.65	$ 1.67	$ 1.66	$ 1.68	$ 1.65	$ 1.65
Auxiliary Energy Required Heating [GJ/yr]	218.6	215.4	220.5	218.7	217.2	215.4	218.7	215.4	218.1	220.5
Annual Energy DHW [GJ/yr]	95.1	95.1	95.1	93.6	95.1	93.6	92.5	92.5	95.1	93.6
Annual Energy Space Heating [GJ/yr]	231.6	228.1	233.6	231.6	230.1	228.2	231.6	228.2	231	233.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	482	478.5	484	480.4	480.5	477	479.4	476	481.4	482.4
Design Heating Load [W]	31409.1	31204.2	31634.6	31409.1	31429.6	31204.2	31409.1	31204.2	31367.7	31634.6
Annual Energy Electricity [kWh/yr]	44282.5	44265.3	44292.4	44282.6	44275.1	44265.4	44282.7	44265.5	44279.7	44292.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,202.66	$ 6,200.22	$ 6,204.06	$ 6,202.67	$ 6,201.61	$ 6,200.24	$ 6,202.69	$ 6,200.25	$ 6,202.26	$ 6,204.07
Annual Energy Natural Gas [m3/yr]	8661.9	8570.9	8713.7	8620.5	8622.5	8529.6	8593	8502	8647	8672.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,736.44	$ 3,697.19	$ 3,758.79	$ 3,718.58	$ 3,719.45	$ 3,679.37	$ 3,706.72	$ 3,667.47	$ 3,730.01	$ 3,740.97
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	64624	65488	64336	64625	65200	65489	64626	65490	64642	64337
Upgrade Package List	Pkg4300332033	Pkg4300432033	Pkg4300322033	Pkg4300332033	Pkg4300422033	Pkg4300432033	Pkg4300332033	Pkg4300422033	Pkg4300332034	Pkg4300322033
GHGI [kg/m2]	16.81	16.64	16.91	16.74	16.74	16.56	16.68	16.51	16.79	16.83
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%	1.7%	1.8%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	59.8	58.9	60.3	59.8	59.4	58.9	59.8	58.9	59.7	60.3
Output: MEUI [kWh/(m2 * yr)]	89.8	88.9	90.3	89.4	89.4	88.4	89.1	88.2	89.6	89.9
Output: Better than ERS (%)	1430.0%	1490.0%	1390.0%	1460.0%	1460.0%	1520.0%	1480.0%	1540.0%	1440.0%	1420.0%
Output: Better than Envelope (%)	4800.0%	4880.0%	4760.0%	4800.0%	4830.0%	4880.0%	4800.0%	4880.0%	4810.0%	4760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6642	6659	6632	6642	6649	6659	6642	6659	6645	6632
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 936.49	$ 938.92	$ 935.1	$ 936.48	$ 937.54	$ 938.9	$ 936.47	$ 938.89	$ 936.89	$ 935.08
Annual savings in carbon tax for electricity [$/year]	$ 3.32	$ 3.33	$ 3.32	$ 3.32	$ 3.32	$ 3.33	$ 3.32	$ 3.33	$ 3.32	$ 3.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 939.81	$ 942.25	$ 938.41	$ 939.8	$ 940.86	$ 942.23	$ 939.79	$ 942.22	$ 940.21	$ 938.4
Annual savings in GHG from electricity savings [kg CO2e/year]	73.1	73.2	73	73.1	73.1	73.2	73.1	73.2	73.1	72.9
Annual savings in natural gas [m3/year]	446.09	449.48	444.16	447.64	447.56	451.02	448.66	452.05	446.65	445.7
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,133.06	$ 4,164.47	$ 4,115.18	$ 4,147.35	$ 4,146.66	$ 4,178.73	$ 4,156.84	$ 4,188.26	$ 4,138.2	$ 4,129.43
Annual savings in carbon tax for natural gas [$/year]	$ 1,031.59	$ 1,039.43	$ 1,027.13	$ 1,035.16	$ 1,034.99	$ 1,042.99	$ 1,037.53	$ 1,045.37	$ 1,032.88	$ 1,030.69
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,164.65	$ 5,203.9	$ 5,142.3	$ 5,182.51	$ 5,181.64	$ 5,221.72	$ 5,194.37	$ 5,233.62	$ 5,171.08	$ 5,160.12
Annual savings in GHG from natural gas savings [kg CO2e/year]	22924.3	23098.5	22825.1	23003.5	22999.7	23177.6	23056.2	23230.4	22952.8	22904.2
Net Present Value [$]	$ 79,864.42	$ 79,838.63	$ 79,684.25	$ 79,660.98	$ 79,660.34	$ 79,634.28	$ 79,591.07	$ 79,565.34	$ 79,496.44	$ 79,479.66
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR20	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR14	BC EffR14
Foundation Slab on Grade Cost of Upgrade	$ 5,386.91	$ 6,219.22	$ 5,386.91	$ 5,386.91	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 6,219.22	$ 5,386.91	$ 5,386.91
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32
Exposed Floor RSI	6.34	6.34	5.64	6.34	5.64	6.34	6.34	6.34	6.34	5.64
Exposed Floor Cost of Upgrade	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA	DWHR eff 30
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$.	$ 550.

ROWHOUSE Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 36,565.16	$ 36,860.63	$ 37,057.76	$ 37,065.16	$ 37,115.16	$ 37,139.69	$ 37,156.48	$ 37,336.82	$ 37,360.63	$ 37,397.47
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 54,920.87	$ 55,364.67	$ 55,660.76	$ 55,671.87	$ 55,746.97	$ 55,783.81	$ 55,809.03	$ 56,079.9	$ 56,115.67	$ 56,171.
Net Present Value [$]	$ 11,796.26	$ 12,999.81	$ 10,807.21	$ 11,460.22	$ 11,656.82	$ 13,554.07	$ 10,223.	$ 11,334.45	$ 12,663.04	$ 12,207.35
Incremental dollars per GHG saving	$ 1.11	$ 1.12	$ 1.12	$ 1.12	$ 1.12	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13
Auxiliary Energy Required Heating [GJ/yr]	236.8	233.4	236.5	236.3	236.8	231.6	237.5	234.6	232.9	233.5
Annual Energy DHW [GJ/yr]	119.1	119.1	119.1	119.1	117.2	119.1	119.1	119.1	119.1	119.1
Annual Energy Space Heating [GJ/yr]	160.6	158.5	161.4	160.4	160.6	157.4	162.1	160.3	158.3	158.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	439	436.9	439.7	438.8	437.2	435.8	440.4	438.6	436.7	437.3
Design Heating Load [W]	34547.4	34128.2	35399.6	34505.9	34547.4	33902.7	35491.7	35174.2	34086.7	34342.4
Annual Energy Electricity [kWh/yr]	88873.2	88290.9	89066	88809.5	88873.2	87967.2	89254.6	88752.8	88227.5	88390.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,512.24	$ 12,429.85	$ 12,539.52	$ 12,503.23	$ 12,512.24	$ 12,384.04	$ 12,566.21	$ 12,495.21	$ 12,420.88	$ 12,443.9
Annual Energy Natural Gas [m3/yr]	3197.4	3197.4	3197.4	3197.4	3148.4	3197.4	3197.4	3197.4	3197.4	3197.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,358.11	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,379.25	$ 1,379.25
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	62326	62614	57358	62344	62327	62902	57826	58006	62632	63190
Upgrade Package List	Pkg4200312033	Pkg4200322033	Pkg3300222032	Pkg4200312034	Pkg4200312033	Pkg4200332033	Pkg3300231034	Pkg3300232032	Pkg4200322034	Pkg4200412033
GHGI [kg/m2]	6.99	6.99	6.99	6.99	6.9	6.98	7	6.99	6.99	6.99
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	64.8	63.9	64.7	64.6	64.8	63.4	65	64.2	63.7	63.9
Output: MEUI [kWh/(m2 * yr)]	77.9	77.3	78.1	77.8	77.4	77	78.2	77.8	77.2	77.4
Output: Better than ERS (%)	1930.0%	1970.0%	1920.0%	1940.0%	1970.0%	1990.0%	1910.0%	1940.0%	1980.0%	1960.0%
Output: Better than Envelope (%)	4370.0%	4450.0%	4380.0%	4380.0%	4370.0%	4490.0%	4350.0%	4420.0%	4460.0%	4450.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	37949	37367	38142	37885	37949	37043	38330	37828	37303	37466
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,350.79	$ 5,268.69	$ 5,377.98	$ 5,341.81	$ 5,350.79	$ 5,223.05	$ 5,404.57	$ 5,333.82	$ 5,259.75	$ 5,282.69
Annual savings in carbon tax for electricity [$/year]	$ 18.97	$ 18.68	$ 19.07	$ 18.94	$ 18.97	$ 18.52	$ 19.17	$ 18.91	$ 18.65	$ 18.73
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,369.77	$ 5,287.37	$ 5,397.05	$ 5,360.76	$ 5,369.77	$ 5,241.57	$ 5,423.74	$ 5,352.73	$ 5,278.4	$ 5,301.42
Annual savings in GHG from electricity savings [kg CO2e/year]	417.4	411	419.6	416.7	417.4	407.5	421.6	416.1	410.3	412.1
Annual savings in natural gas [m3/year]	649.69	649.69	649.69	649.69	651.52	649.69	649.69	649.69	649.69	649.69
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,036.34	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,019.42	$ 6,019.42
Annual savings in carbon tax for natural gas [$/year]	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,506.64	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,502.42	$ 1,502.42
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,542.98	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,521.84	$ 7,521.84
Annual savings in GHG from natural gas savings [kg CO2e/year]	33387.1	33387.1	33387.1	33387.1	33480.9	33387.1	33387.1	33387.1	33387.1	33387.1
Net Present Value [$]	$ 11,796.26	$ 12,999.81	$ 10,807.21	$ 11,460.22	$ 11,656.82	$ 13,554.07	$ 10,223.	$ 11,334.45	$ 12,663.04	$ 12,207.35
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	9.02	11.2	11.2	11.2
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 1,551.24	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	5.28	5.28	7.04	7.04	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 16,797.	$ 13,865.16	$ 13,865.16
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR14	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 5,386.91	$ 5,386.91	$ 4,092.2	$ 5,386.91	$ 5,386.91	$ 5,386.91	$ 4,092.2	$ 4,092.2	$ 5,386.91	$ 6,219.22
Exposed Floor Code	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	NA
Exposed Floor RSI	4.67	5.64	5.64	4.67	4.67	6.34	6.34	6.34	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$ 295.47	$ 295.47	$.	$.	$ 574.53	$ 574.53	$ 574.53	$ 295.47	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 85	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 1,800.	$ 1,360.	$ 2,300.	$ 1,800.	$ 1,800.	$ 2,300.	$ 1,360.	$ 2,300.	$ 1,800.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

ROWHOUSE Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 37,460.63	$ 37,665.16	$ 37,657.76	$ 37,739.69	$ 38,010.63	$ 37,936.82	$ 36,565.16	$ 37,960.63	$ 37,997.47	$ 38,097.76
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 56,265.87	$ 56,573.07	$ 56,561.96	$ 56,685.01	$ 57,091.97	$ 56,981.1	$ 54,920.87	$ 57,016.87	$ 57,072.2	$ 57,222.84
Net Present Value [$]	$ 17,560.1	$ 16,006.81	$ 15,673.87	$ 18,105.96	$ 17,353.66	$ 16,215.17	$ 11,796.26	$ 17,212.92	$ 16,788.27	$ 15,847.36
Incremental dollars per GHG saving	$ 1.1	$ 1.1	$ 1.1	$ 1.1	$ 1.11	$ 1.11	$ 1.11	$ 1.11	$ 1.11	$ 1.11
Auxiliary Energy Required Heating [GJ/yr]	234.8	237.7	237.3	233	234.9	235.4	236.8	234.3	234.9	235.8
Annual Energy DHW [GJ/yr]	95.1	95.1	95.1	95.1	93.6	95.1	119.1	95.1	95.1	95.1
Annual Energy Space Heating [GJ/yr]	158.9	160.8	161.3	157.7	158.9	160.1	160.6	158.7	159.2	160.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	413.3	415.2	415.7	412.1	411.7	414.5	439	413.1	413.6	414.8
Design Heating Load [W]	33754.8	34132.6	34938.1	33529.4	33754.8	34712.6	34547.4	33713.3	33969.1	34744.5
Annual Energy Electricity [kWh/yr]	88377.6	88901.5	89033.7	88057.2	88380.2	88715.1	88873.2	88318.3	88468.9	88795.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,442.12	$ 12,516.25	$ 12,534.95	$ 12,396.78	$ 12,442.48	$ 12,489.87	$ 12,512.24	$ 12,433.72	$ 12,455.03	$ 12,501.23
Annual Energy Natural Gas [m3/yr]	2554.7	2554.7	2554.7	2554.7	2512.9	2554.7	3197.4	2554.7	2554.7	2554.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,102.01	$ 1,102.01	$ 1,102.01	$ 1,102.01	$ 1,083.98	$ 1,102.01	$ 1,379.25	$ 1,102.01	$ 1,102.01	$ 1,102.01
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	62617	62347	57361	62905	62618	58009	62326	62635	63193	57379
Upgrade Package List	Pkg4200322033	Pkg4200312034	Pkg3300222032	Pkg4200332033	Pkg4200322033	Pkg3300232032	Pkg4200322033	Pkg4200322034	Pkg4200412033	Pkg3300222033
GHGI [kg/m2]	5.77	5.78	5.78	5.77	5.7	5.78	6.99	5.77	5.78	5.78
% ICC	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	64.2	65	64.9	63.7	64.3	64.4	64.8	64.1	64.3	64.5
Output: MEUI [kWh/(m2 * yr)]	70.8	71.3	71.5	70.5	70.4	71.2	77.9	70.8	70.9	71.2
Output: Better than ERS (%)	2310.0%	2280.0%	2270.0%	2330.0%	2340.0%	2290.0%	1930.0%	2320.0%	2310.0%	2280.0%
Output: Better than Envelope (%)	4420.0%	4350.0%	4360.0%	4460.0%	4410.0%	4400.0%	4370.0%	4430.0%	4410.0%	4390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	37453	37977	38109	37133	37456	37791	37949	37394	37545	37871
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,280.92	$ 5,354.79	$ 5,373.43	$ 5,235.74	$ 5,281.28	$ 5,328.5	$ 5,350.79	$ 5,272.55	$ 5,293.79	$ 5,339.83
Annual savings in carbon tax for electricity [$/year]	$ 18.73	$ 18.99	$ 19.05	$ 18.57	$ 18.73	$ 18.9	$ 18.97	$ 18.7	$ 18.77	$ 18.94
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,299.64	$ 5,373.77	$ 5,392.48	$ 5,254.31	$ 5,300.01	$ 5,347.4	$ 5,369.77	$ 5,291.25	$ 5,312.56	$ 5,358.76
Annual savings in GHG from electricity savings [kg CO2e/year]	412	417.7	419.2	408.5	412	415.7	417.4	411.3	413	416.6
Annual savings in natural gas [m3/year]	673.64	673.64	673.64	673.64	675.2	673.64	649.69	673.64	673.64	673.64
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 6,241.29	$ 6,241.29	$ 6,241.29	$ 6,241.29	$ 6,255.72	$ 6,241.29	$ 6,019.42	$ 6,241.29	$ 6,241.29	$ 6,241.29
Annual savings in carbon tax for natural gas [$/year]	$ 1,557.8	$ 1,557.8	$ 1,557.8	$ 1,557.8	$ 1,561.4	$ 1,557.8	$ 1,502.42	$ 1,557.8	$ 1,557.8	$ 1,557.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 7,799.08	$ 7,799.08	$ 7,799.08	$ 7,799.08	$ 7,817.11	$ 7,799.08	$ 7,521.84	$ 7,799.08	$ 7,799.08	$ 7,799.08
Annual savings in GHG from natural gas savings [kg CO2e/year]	34617.7	34617.7	34617.7	34617.7	34697.7	34617.7	33387.1	34617.7	34617.7	34617.7
Net Present Value [$]	$ 17,560.1	$ 16,006.81	$ 15,673.87	$ 18,105.96	$ 17,353.66	$ 16,215.17	$ 11,796.26	$ 17,212.92	$ 16,788.27	$ 15,847.36
ECM Details Envelope Components										
Attic Ceiling RSI	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51	$ 6,941.51
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	7.04	5.28	5.28	7.04	5.28	5.28	5.28	7.04
Above Grade Wall Cost of Upgrade	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 16,797.	$ 13,865.16	$ 13,865.16	$ 13,865.16	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR10
Foundation Slab on Grade Cost of Upgrade	$ 5,386.91	$ 5,386.91	$ 4,092.2	$ 5,386.91	$ 5,386.91	$ 4,092.2	$ 5,386.91	$ 5,386.91	$ 6,219.22	$ 4,092.2
Exposed Floor Code	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	NA	BC ExpFloor R32	NA	BC ExpFloor R32
Exposed Floor RSI	5.64	4.67	5.64	6.34	5.64	6.34	4.67	5.64	4.67	5.64
Exposed Floor Cost of Upgrade	$ 295.47	$.	$ 295.47	$ 574.53	$ 295.47	$ 574.53	$.	$ 295.47	$.	$ 295.47
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 60	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 85	HRV sre 75	HRV sre 75
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	NA	NA	NA	NA	DWHR eff 30	NA	NA	NA	NA	NA
Heating Cooling System Cost of Upgrade	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.	$ 3,150.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 1,360.	$ 1,800.	$ 1,800.	$ 1,360.	$ 1,800.	$ 2,300.	$ 1,800.	$ 1,800.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$ 550.	$.	$.	$.	$.	$.

ROWHOUSE Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k	rowhouse.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 00 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 30	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>BCGasTankless0.95 Opt DWHR=>DWHR eff 55	ACH@50Pa=>ACH 0 6 Opt Windows=>USI0 80 SHGC0 25 Opt AboveGradeWall=>BC R 40 eff Opt FoundationSlabOnGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 85 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 72,571.44	$ 72,771.44	$ 73,071.44	$ 87,298.95	$ 87,016.64	$ 87,019.89	$ 87,848.95	$ 87,316.64	$ 88,148.95	$ 87,798.95
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 109,002.3	$ 109,302.7	$ 109,753.3	$ 131,123.02	$ 130,698.99	$ 130,703.87	$ 131,949.12	$ 131,149.59	$ 132,399.72	$ 131,874.02
Net Present Value [$]	$ 57,524.38	$ 57,215.63	$ 57,146.87	$ 43,191.65	$ 43,047.43	$ 43,021.25	$ 42,988.02	$ 42,978.49	$ 42,919.08	$ 42,818.45
Incremental dollars per GHG saving	$ 2.82	$ 2.83	$ 2.83	$ 3.38	$ 3.38	$ 3.38	$ 3.39	$ 3.39	$ 3.4	$ 3.4
Auxiliary Energy Required Heating [GJ/yr]	169.7	169.2	169.2	165.7	168.8	167.5	165.7	168.9	165.7	165.2
Annual Energy DHW [GJ/yr]	92.5	93.6	92.5	95.1	93.6	95.1	93.6	92.5	92.5	95.1
Annual Energy Space Heating [GJ/yr]	179.7	179.2	179.2	175.5	178.8	177.5	175.5	178.9	175.6	175
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Energy [GJ/yr]	427.5	428	427	425.9	427.7	427.8	424.4	426.7	423.4	425.4
Design Heating Load [W]	26298	26256.6	26256.6	24547.6	24752.5	24773	24547.6	24752.5	24547.6	24506.1
Annual Energy Electricity [kWh/yr]	44023.6	44021	44021	44002.7	44019.3	44012.3	44002.8	44019.4	44002.9	44000
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 6,166.02	$ 6,165.66	$ 6,165.66	$ 6,163.07	$ 6,165.42	$ 6,164.43	$ 6,163.08	$ 6,165.43	$ 6,163.1	$ 6,162.68
Annual Energy Natural Gas [m3/yr]	7224.1	7237.9	7210.3	7183.4	7229.2	7234.1	7142	7201.6	7114.4	7169.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 3,116.22	$ 3,122.18	$ 3,110.27	$ 3,098.67	$ 3,118.42	$ 3,120.54	$ 3,080.81	$ 3,106.52	$ 3,068.9	$ 3,092.5
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	65706	65723	65724	65596	64733	65308	65597	64734	65598	65614
Upgrade Package List	Pkg4300433053	Pkg4300433054	Pkg4300433054	Pkg4300432063	Pkg4300332063	Pkg4300422063	Pkg4300432063	Pkg4300332063	Pkg4300432063	Pkg4300432064
GHGI [kg/m2]	14.1	14.13	14.07	14.02	14.11	14.12	13.94	14.06	13.89	14
% ICC	3.3%	3.3%	3.3%	3.9%	3.9%	3.9%	4.0%	3.9%	4.0%	4.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	46.4	46.3	46.3	45.3	46.2	45.8	45.3	46.2	45.3	45.2
Output: MEUI [kWh/(m2 * yr)]	74.9	75	74.8	74.5	74.9	75	74	74.7	73.8	74.3
Output: Better than ERS (%)	2400.0%	2390.0%	2410.0%	2430.0%	2400.0%	2390.0%	2450.0%	2410.0%	2470.0%	2440.0%
Output: Better than Envelope (%)	5960.0%	5980.0%	5980.0%	6060.0%	5990.0%	6020.0%	6060.0%	5980.0%	6060.0%	6070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6901	6903	6903	6922	6905	6912	6922	6905	6921	6924
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 973.	$ 973.37	$ 973.37	$ 975.95	$ 973.6	$ 974.59	$ 975.93	$ 973.59	$ 975.92	$ 976.33
Annual savings in carbon tax for electricity [$/year]	$ 3.45	$ 3.45	$ 3.45	$ 3.46	$ 3.45	$ 3.46	$ 3.46	$ 3.45	$ 3.46	$ 3.46
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 976.45	$ 976.82	$ 976.82	$ 979.41	$ 977.06	$ 978.05	$ 979.39	$ 977.04	$ 979.38	$ 979.79
Annual savings in GHG from electricity savings [kg CO2e/year]	75.9	75.9	75.9	76.1	76	76	76.1	76	76.1	76.2
Annual savings in natural gas [m3/year]	499.66	499.15	500.18	501.18	499.47	499.29	502.72	500.5	503.75	501.71
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 4,629.39	$ 4,624.63	$ 4,634.16	$ 4,643.44	$ 4,627.63	$ 4,625.94	$ 4,657.73	$ 4,637.16	$ 4,667.26	$ 4,648.38
Annual savings in carbon tax for natural gas [$/year]	$ 1,155.47	$ 1,154.29	$ 1,156.66	$ 1,158.98	$ 1,155.03	$ 1,154.61	$ 1,162.55	$ 1,157.41	$ 1,164.93	$ 1,160.21
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 5,784.87	$ 5,778.91	$ 5,790.82	$ 5,802.42	$ 5,782.67	$ 5,780.55	$ 5,820.28	$ 5,794.57	$ 5,832.19	$ 5,808.59
Annual savings in GHG from natural gas savings [kg CO2e/year]	25677.2	25650.8	25703.6	25755.1	25667.4	25658.1	25834.4	25720.3	25887.2	25782.5
Net Present Value [$]	$ 57,524.38	$ 57,215.63	$ 57,146.87	$ 43,191.65	$ 43,047.43	$ 43,021.25	$ 42,988.02	$ 42,978.49	$ 42,919.08	$ 42,818.45
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 5,903.32	$ 5,903.32	$ 5,903.32	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58	$ 2,671.58
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI1 00 SHGC0 35	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25	USI0 80 SHGC0 25
Window Cost of Upgrade	$ 37,077.37	$ 37,077.37	$ 37,077.37	$ 55,886.62	$ 55,886.62	$ 55,886.62	$ 55,886.62	$ 55,886.62	$ 55,886.62	$ 55,886.62
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.	$ 16,797.
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	BC EffR20	BC EffR20	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab on Grade Cost of Upgrade	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 6,219.22	$ 5,386.91	$ 6,219.22	$ 5,386.91	$ 6,219.22	$ 6,219.22	$ 6,219.22
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	5.64	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 574.53	$ 295.47	$ 574.53	$ 574.53	$ 574.53	$ 574.53
ECM Details Mechanical Components										
Heating Cooling System Code	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace	NBC gas furnace
Ventilation System Code	HRV sre 75	HRV sre 85	HRV sre 85	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 85
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	DWHR eff 55	DWHR eff 30	DWHR eff 55	NA	DWHR eff 30	NA	DWHR eff 30	DWHR eff 55	DWHR eff 55	NA
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 1,800.	$ 2,300.	$ 2,300.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 1,800.	$ 2,300.
DHW System Cost of Upgrade	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.	$ 600.
Drain Water Heat Recovery Cost of Upgrade	$ 850.	$ 550.	$ 850.	$.	$ 550.	$.	$ 550.	$ 850.	$ 850.	$.

MURB Vancouver: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85
ICC with multiplier (Van=1.0,this Cz =1)	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85
Net Present Value [$]	$ 40,935.46	$ 40,935.46	$ 38,294.18	$ 36,083.56	$ 36,083.56	$ 33,429.32	$ 33,429.32	$ 33,429.32	$ 41,187.34	$ 41,187.34
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	137.3	137.3	141	144.1	144.1	147.8	147.8	147.8	136.9	136.9
Annual Energy DHW [GJ/yr]	112.9	112.9	112.9	113.1	113.1	113.1	113.1	113.1	112.9	112.9
Annual Energy Space Heating [GJ/yr]	137.3	137.3	141	144	144	147.7	147.7	147.7	136.9	136.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	410	410	413.7	416.9	416.9	420.6	420.6	420.6	409.6	409.6
Design Heating Load [W]	26405.5	26405.5	26918.5	27180.7	27180.7	27693.7	27693.7	27693.7	26351	26351
Annual Energy Electricity [kWh/yr]	82527.5	82527.5	83553.5	84398.9	84398.9	85429.9	85429.9	85429.9	82407.4	82407.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,614.33	$ 11,614.33	$ 11,759.51	$ 11,879.13	$ 11,879.13	$ 12,025.02	$ 12,025.02	$ 12,025.02	$ 11,597.33	$ 11,597.33
Annual Energy Natural Gas [m3/yr]	3031.9	3031.9	3031.9	3036	3036	3036	3036	3036	3031.4	3031.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,307.86	$ 1,307.86	$ 1,307.86	$ 1,309.62	$ 1,309.62	$ 1,309.62	$ 1,309.62	$ 1,309.62	$ 1,307.64	$ 1,307.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	181	541	361	1261	1621	1	1081	1441	2341	2701
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1101011011	Pkg1110021011	Pkg1111021011	Pkg1100011011	Pkg1110011011	Pkg1111011011	Pkg1120021011	Pkg1121021011
GHGI [kg/m2]	4.06	4.06	4.06	4.07	4.07	4.08	4.08	4.08	4.06	4.06
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	23.1	23.1	23.7	24.2	24.2	24.8	24.8	24.8	23	23
Output: MEUI [kWh/(m2 * yr)]	43	43.6	43.6	44.2	44.2	44.8	44.8	44.8	42.9	42.9
Output: Better than ERS (%)	1170.0%	1170.0%	1280.0%	1360.0%	1360.0%	1460.0%	1460.0%	1460.0%	1160.0%	1160.0%
Output: Better than Envelope (%)	6520.0%	6520.0%	6970.0%	7340.0%	7340.0%	7790.0%	7790.0%	7790.0%	6470.0%	6470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	24378	24378	23352	22506	22506	21476	21476	21476	24498	24498
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,437.28	$ 3,437.28	$ 3,292.62	$ 3,173.42	$ 3,173.42	$ 3,028.05	$ 3,028.05	$ 3,028.05	$ 3,454.22	$ 3,454.22
Annual savings in carbon tax for electricity [$/year]	$ 12.19	$ 12.19	$ 11.68	$ 11.25	$ 11.25	$ 10.74	$ 10.74	$ 10.74	$ 12.25	$ 12.25
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,449.47	$ 3,449.47	$ 3,304.29	$ 3,184.67	$ 3,184.67	$ 3,038.78	$ 3,038.78	$ 3,038.78	$ 3,466.47	$ 3,466.47
Annual savings in GHG from electricity savings [kg CO2e/year]	268.2	268.2	256.9	247.6	247.6	236.2	236.2	236.2	269.5	269.5
Annual savings in natural gas [m3/year]	23.11	23.11	23.11	23.26	23.26	23.26	23.26	23.26	23.09	23.09
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.1	$ 214.1	$ 214.1	$ 215.51	$ 215.51	$ 215.51	$ 215.51	$ 215.51	$ 213.92	$ 213.92
Annual savings in carbon tax for natural gas [$/year]	$ 53.44	$ 53.44	$ 53.44	$ 53.79	$ 53.79	$ 53.79	$ 53.79	$ 53.79	$ 53.39	$ 53.39
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 267.53	$ 267.53	$ 267.53	$ 269.3	$ 269.3	$ 269.3	$ 269.3	$ 269.3	$ 267.32	$ 267.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	1187.5	1187.5	1187.5	1195.3	1195.3	1195.3	1195.3	1195.3	1186.5	1186.5
Net Present Value [$]	$ 40,935.46	$ 40,935.46	$ 38,294.18	$ 36,083.56	$ 36,083.56	$ 33,429.32	$ 33,429.32	$ 33,429.32	$ 41,187.34	$ 41,187.34
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	4.67	5.64	5.64	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,369.07
ICC with multiplier (Van=1.0,this Cz =1)	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,369.07
Net Present Value [$]	$ 2,687.19	$ 2,687.19	$ 2,329.57	$ 2,329.57	$ 5,353.84	$ 4,996.23	$ 4,996.23	$ 8,926.12	$ 8,926.12	$ 11,592.23
Incremental dollars per GHG saving	$ 6.53	$ 6.53	$ 6.54	$ 6.54	$ 6.55	$ 6.56	$ 6.56	$ 6.57	$ 6.57	$ 6.59
Auxiliary Energy Required Heating [GJ/yr]	168.3	168.3	167.7	167.7	172	171.4	171.4	177	177	180.7
Annual Energy DHW [GJ/yr]	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4
Annual Energy Space Heating [GJ/yr]	168.2	168.2	167.6	167.6	171.9	171.3	171.3	176.9	176.9	180.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	374.4	374.4	373.8	373.8	378.1	377.5	377.5	383.1	383.1	386.9
Design Heating Load [W]	26317	26317	26262.4	26262.4	26830	26775.4	26775.4	27092.1	27092.1	27605.1
Annual Energy Electricity [kWh/yr]	103999.6	103999.6	103836.7	103836.7	105035.4	104872.5	104872.5	106423	106423	107458.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,652.63	$ 14,652.63	$ 14,629.58	$ 14,629.58	$ 14,799.19	$ 14,776.14	$ 14,776.14	$ 14,995.54	$ 14,995.54	$ 15,142.08
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	183	543	2343	2703	363	2163	2523	1263	1623	3
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1120021011	Pkg1121021011	Pkg1101011011	Pkg1120011011	Pkg1121011011	Pkg1110021011	Pkg1111021011	Pkg1100011011
GHGI [kg/m2]	0.69	0.69	0.69	0.69	0.7	0.7	0.7	0.71	0.71	0.71
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	28.3	28.3	28.2	28.2	28.9	28.8	28.8	29.7	29.7	30.3
Output: MEUI [kWh/(m2 * yr)]	37	37	36.9	36.9	37.7	37.6	37.6	38.5	38.5	39.1
Output: Better than ERS (%)	780.0%	780.0%	770.0%	770.0%	890.0%	870.0%	870.0%	1030.0%	1030.0%	1140.0%
Output: Better than Envelope (%)	10250.0%	10250.0%	10180.0%	10180.0%	10700.0%	10630.0%	10630.0%	11300.0%	11300.0%	11740.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	2906	2906	3069	3069	1870	2033	2033	482	482	553
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 409.72	$ 409.72	$ 432.69	$ 432.69	$ 263.67	$ 286.64	$ 286.64	$ 68.02	$ 68.02	$ 78.
Annual savings in carbon tax for electricity [$/year]	$ 1.45	$ 1.45	$ 1.53	$ 1.53	$ .94	$ 1.02	$ 1.02	$ .24	$ .24	$ .28
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 411.17	$ 411.17	$ 434.22	$ 434.22	$ 264.6	$ 287.66	$ 287.66	$ 68.26	$ 68.26	$ 78.28
Annual savings in GHG from electricity savings [kg CO2e/year]	32	32	33.8	33.8	20.6	22.4	22.4	5.3	5.3	6.1
Annual savings in natural gas [m3/year]	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53
Annual savings in carbon tax for natural gas [$/year]	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7
Net Present Value [$]	$ 2,687.19	$ 2,687.19	$ 2,329.57	$ 2,329.57	$ 5,353.84	$ 4,996.23	$ 4,996.23	$ 8,926.12	$ 8,926.12	$ 11,592.23
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	5.64	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 57,576.39	$ 57,576.39	$ 57,514.61	$ 57,514.61	$ 58,143.19	$ 58,081.41	$ 48,190.85	$ 48,190.85	$ 48,129.07	$ 48,129.07
ICC with multiplier (Van=1.0,this Cz =1)	$ 57,576.39	$ 57,576.39	$ 57,514.61	$ 57,514.61	$ 58,143.19	$ 58,081.41	$ 48,190.85	$ 48,190.85	$ 48,129.07	$ 48,129.07
Net Present Value [$]	$ 68,760.62	$ 68,760.62	$ 68,726.07	$ 68,726.07	$ 68,328.92	$ 68,263.45	$ 67,986.73	$ 67,986.73	$ 67,941.41	$ 67,941.41
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	93.4	93.4	93.8	93.8	92.8	93.3	136.9	136.9	137.3	137.3
Annual Energy DHW [GJ/yr]	112.9	112.9	113	113	112.9	112.9	112.9	112.9	112.9	112.9
Annual Energy Space Heating [GJ/yr]	36	36	36.2	36.2	35.9	36	52.3	52.3	52.5	52.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	313.9	313.9	314	314	313.6	313.8	328	328	328.2	328.2
Design Heating Load [W]	25132.9	25132.9	25187.4	25187.4	25066.9	25133.3	27842.3	27842.3	27896.8	27896.8
Annual Energy Electricity [kWh/yr]	55811.5	55811.5	55847.3	55847.3	55761.6	55808.7	59762.3	59762.3	59802.3	59802.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 7,834.01	$ 7,834.01	$ 7,839.08	$ 7,839.08	$ 7,826.95	$ 7,833.62	$ 8,393.05	$ 8,393.05	$ 8,398.71	$ 8,398.71
Annual Energy Natural Gas [m3/yr]	3032.7	3032.7	3033.2	3033.2	3031.9	3032.6	3031.3	3031.3	3031.8	3031.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,308.2	$ 1,308.2	$ 1,308.42	$ 1,308.42	$ 1,307.86	$ 1,308.16	$ 1,307.6	$ 1,307.6	$ 1,307.81	$ 1,307.81
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	2380	2740	220	580	3100	940	2344	2704	184	544
Upgrade Package List	Pkg1120021031	Pkg1121021031	Pkg1100021031	Pkg1101021031	Pkg1122021031	Pkg1102021031	Pkg1120021011	Pkg1121021011	Pkg1100021011	Pkg1101021011
GHGI [kg/m2]	3.88	3.88	3.88	3.88	3.88	3.88	3.91	3.91	3.91	3.91
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.2%	1.2%	1.1%	1.1%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	15.7	15.7	15.7	15.7	15.6	15.7	23	23	23.1	23.1
Output: MEUI [kWh/(m2 * yr)]	26.8	26.8	26.8	26.8	26.7	26.8	29.2	29.2	29.2	29.2
Output: Better than ERS (%)	1790.0%	1790.0%	1790.0%	1790.0%	1800.0%	1790.0%	1420.0%	1420.0%	1420.0%	1420.0%
Output: Better than Envelope (%)	1240.0%	1240.0%	1290.0%	1290.0%	1170.0%	1230.0%	6470.0%	6470.0%	6520.0%	6520.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	51094	51094	51058	51058	51144	51097	47143	47143	47103	47103
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,204.24	$ 7,204.24	$ 7,199.19	$ 7,199.19	$ 7,211.28	$ 7,204.63	$ 6,647.18	$ 6,647.18	$ 6,641.54	$ 6,641.54
Annual savings in carbon tax for electricity [$/year]	$ 25.55	$ 25.55	$ 25.53	$ 25.53	$ 25.57	$ 25.55	$ 23.57	$ 23.57	$ 23.55	$ 23.55
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,229.79	$ 7,229.79	$ 7,224.72	$ 7,224.72	$ 7,236.85	$ 7,230.18	$ 6,670.75	$ 6,670.75	$ 6,665.09	$ 6,665.09
Annual savings in GHG from electricity savings [kg CO2e/year]	562	562	561.6	561.6	562.6	562.1	518.6	518.6	518.1	518.1
Annual savings in natural gas [m3/year]	23.14	23.14	23.16	23.16	23.11	23.13	23.09	23.09	23.1	23.1
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.37	$ 214.37	$ 214.54	$ 214.54	$ 214.1	$ 214.34	$ 213.89	$ 213.89	$ 214.06	$ 214.06
Annual savings in carbon tax for natural gas [$/year]	$ 53.51	$ 53.51	$ 53.55	$ 53.55	$ 53.44	$ 53.5	$ 53.39	$ 53.39	$ 53.43	$ 53.43
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 267.88	$ 267.88	$ 268.09	$ 268.09	$ 267.53	$ 267.83	$ 267.27	$ 267.27	$ 267.49	$ 267.49
Annual savings in GHG from natural gas savings [kg CO2e/year]	1189	1189	1190	1190	1187.5	1188.8	1186.3	1186.3	1187.3	1187.3
Net Present Value [$]	$ 68,760.62	$ 68,760.62	$ 68,726.07	$ 68,726.07	$ 68,328.92	$ 68,263.45	$ 67,986.73	$ 67,986.73	$ 67,941.41	$ 67,941.41
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	NA	NA	NA	NA
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 61.78	$.	$.	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 24,136.67	$ 24,136.67	$ 24,198.45	$ 24,198.45	$ 24,703.47	$ 24,765.25	$ 24,765.25	$ 25,129.07	$ 25,129.07	$ 25,129.07
ICC with multiplier (Van=1.0,this Cz =1)	$ 24,136.67	$ 24,136.67	$ 24,198.45	$ 24,198.45	$ 24,703.47	$ 24,765.25	$ 24,765.25	$ 25,129.07	$ 25,129.07	$ 25,129.07
Net Present Value [$]	$ 48,078.83	$ 48,078.83	$ 48,319.5	$ 48,319.5	$ 47,883.73	$ 48,230.56	$ 45,677.85	$ 44,749.09	$ 44,749.09	$ 42,125.53
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 84.64	$ 84.64	$ 87.96
Auxiliary Energy Required Heating [GJ/yr]	116.8	116.8	116.4	116.4	116.3	115.7	119.3	127.3	127.3	131
Annual Energy DHW [Gj/yr]	112.9	112.9	112.9	112.9	112.9	112.9	112.8	89.8	89.8	89.8
Annual Energy Space Heating [GJ/yr]	116.8	116.8	116.4	116.4	116.3	115.7	119.3	127.3	127.3	131
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	389.5	389.5	389.1	389.1	389	388.4	391.9	377	377	380.6
Design Heating Load [W]	23551	23551	23496.4	23496.4	23496.9	23430.4	23943.4	24579	24579	25092
Annual Energy Electricity [kWh/yr]	76838.3	76838.3	76717.5	76717.5	76691.3	76534.8	77531.6	79759.5	79759.5	80778.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,809.3	$ 10,809.3	$ 10,792.21	$ 10,792.21	$ 10,788.5	$ 10,766.36	$ 10,907.41	$ 11,222.65	$ 11,222.65	$ 11,366.86
Annual Energy Natural Gas [m3/yr]	3031.4	3031.4	3032.4	3032.4	3032.2	3031.5	3029.9	2412.6	2412.6	2412.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,307.64	$ 1,307.64	$ 1,308.07	$ 1,308.07	$ 1,307.99	$ 1,307.68	$ 1,306.99	$ 1,040.71	$ 1,040.71	$ 1,040.71
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	9901	10261	12061	12421	10621	12925	12601	6662	7022	6482
Upgrade Package List	Pkg2200021011	Pkg2201021011	Pkg2220021011	Pkg2221021011	Pkg2202021011	Pkg2222021011	Pkg2222011011	Pkg2100021011	Pkg2101021011	Pkg2100011011
GHGI [kg/m2]	4.02	4.02	4.02	4.02	4.02	4.02	4.02	3.32	3.32	3.33
% ICC	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	19.6	19.6	19.5	19.5	19.5	19.4	20	21.4	21.4	22
Output: MEUI [kWh/(m2 * yr)]	39.6	39.6	39.5	39.5	39.5	39.4	40	37.5	37.5	38.1
Output: Better than ERS (%)	620.0%	620.0%	610.0%	610.0%	600.0%	590.0%	680.0%	510.0%	510.0%	610.0%
Output: Better than Envelope (%)	4060.0%	4060.0%	4010.0%	4010.0%	4000.0%	3920.0%	4360.0%	5320.0%	5320.0%	5760.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	30067	30067	30188	30188	30214	30371	29374	27146	27146	26127
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,239.46	$ 4,239.46	$ 4,256.49	$ 4,256.49	$ 4,260.19	$ 4,282.25	$ 4,141.71	$ 3,827.57	$ 3,827.57	$ 3,683.88
Annual savings in carbon tax for electricity [$/year]	$ 15.03	$ 15.03	$ 15.09	$ 15.09	$ 15.11	$ 15.19	$ 14.69	$ 13.57	$ 13.57	$ 13.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,254.49	$ 4,254.49	$ 4,271.59	$ 4,271.59	$ 4,275.3	$ 4,297.44	$ 4,156.39	$ 3,841.14	$ 3,841.14	$ 3,696.94
Annual savings in GHG from electricity savings [kg CO2e/year]	330.7	330.7	332.1	332.1	332.4	334.1	323.1	298.6	298.6	287.4
Annual savings in natural gas [m3/year]	23.09	23.09	23.13	23.13	23.12	23.09	23.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 213.92	$ 213.92	$ 214.27	$ 214.27	$ 214.2	$ 213.96	$ 213.41	$ .31	$ .31	$ .31
Annual savings in carbon tax for natural gas [$/year]	$ 53.39	$ 53.39	$ 53.48	$ 53.48	$ 53.46	$ 53.4	$ 53.26	$ .08	$ .08	$ .08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 267.32	$ 267.32	$ 267.75	$ 267.75	$ 267.66	$ 267.36	$ 266.67	$ .39	$ .39	$ .39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1186.5	1186.5	1188.5	1188.5	1188.1	1186.7	1183.7	1.7	1.7	1.7
Net Present Value [$]	$ 48,078.83	$ 48,078.83	$ 48,319.5	$ 48,319.5	$ 47,883.73	$ 48,230.56	$ 45,677.85	$ 44,749.09	$ 44,749.09	$ 42,125.53
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$ 566.8	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	4.67	5.64	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 32,869.07	$ 32,869.07	$ 32,930.85	$ 32,930.85	$ 33,435.87	$ 33,497.65	$ 34,384.88	$ 34,384.88	$ 34,446.66	$ 34,446.66
ICC with multiplier (Van=1.0,this Cz =1)	$ 32,869.07	$ 32,869.07	$ 32,930.85	$ 32,930.85	$ 33,435.87	$ 33,497.65	$ 34,384.88	$ 34,384.88	$ 34,446.66	$ 34,446.66
Net Present Value [$]	$ 3,152.93	$ 3,152.93	$ 3,511.64	$ 3,511.64	$ 3,131.51	$ 3,704.58	$ 3,513.91	$ 3,513.91	$ 3,872.07	$ 3,872.07
Incremental dollars per GHG saving	$ 7.02	$ 7.02	$ 7.03	$ 7.03	$ 7.13	$ 7.14	$ 7.33	$ 7.33	$ 7.34	$ 7.34
Auxiliary Energy Required Heating [GJ/yr]	156.6	156.6	156	156	155.8	154.9	154	154	153.4	153.4
Annual Energy DHW [GJ/yr]	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4
Annual Energy Space Heating [GJ/yr]	156.5	156.5	155.9	155.9	155.8	154.9	153.9	153.9	153.3	153.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	362.7	362.7	362.1	362.1	362	361.1	360.1	360.1	359.5	359.5
Design Heating Load [W]	24579	24579	24524.4	24524.4	24524.9	24458.5	24240.9	24240.9	24186.3	24186.3
Annual Energy Electricity [kWh/yr]	100760	100760	100596.7	100596.7	100548.2	100301.6	100031	100031	99867.9	99867.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,194.22	$ 14,194.22	$ 14,171.12	$ 14,171.12	$ 14,164.26	$ 14,129.36	$ 14,091.07	$ 14,091.07	$ 14,067.99	$ 14,067.99
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6663	7023	8823	9183	7383	9543	6753	7113	8913	9273
Upgrade Package List	Pkg2100021011	Pkg2101021011	Pkg2120021011	Pkg2121021011	Pkg2102021011	Pkg2122021011	Pkg2100022011	Pkg2101022011	Pkg2120022011	Pkg2121022011
GHGI [kg/m2]	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.66	0.66
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	26.3	26.3	26.2	26.2	26.2	26	25.8	25.8	25.7	25.7
Output: MEUI [kWh/(m2 * yr)]	35.1	35.1	35	35	35	34.8	34.6	34.6	34.5	34.5
Output: Better than ERS (%)	450.0%	450.0%	430.0%	430.0%	430.0%	400.0%	370.0%	370.0%	350.0%	350.0%
Output: Better than Envelope (%)	8840.0%	8840.0%	8770.0%	8770.0%	8750.0%	8640.0%	8530.0%	8530.0%	8460.0%	8460.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	6145	6145	6309	6309	6357	6604	6874	6874	7038	7038
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 866.5	$ 866.5	$ 889.53	$ 889.53	$ 896.37	$ 931.14	$ 969.29	$ 969.29	$ 992.29	$ 992.29
Annual savings in carbon tax for electricity [$/year]	$ 3.07	$ 3.07	$ 3.15	$ 3.15	$ 3.18	$ 3.3	$ 3.44	$ 3.44	$ 3.52	$ 3.52
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 869.57	$ 869.57	$ 892.68	$ 892.68	$ 899.54	$ 934.44	$ 972.73	$ 972.73	$ 995.81	$ 995.81
Annual savings in GHG from electricity savings [kg CO2e/year]	67.6	67.6	69.4	69.4	69.9	72.6	75.6	75.6	77.4	77.4
Annual savings in natural gas [m3/year]	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53
Annual savings in carbon tax for natural gas [$/year]	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7
Net Present Value [$]	$ 3,152.93	$ 3,152.93	$ 3,511.64	$ 3,511.64	$ 3,131.51	$ 3,704.58	$ 3,513.91	$ 3,513.91	$ 3,872.07	$ 3,872.07
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 51,174.06	$ 60,076.39	$ 60,076.39	$ 60,014.61	$ 60,014.61	$ 51,089.19	$ 53,674.06	$ 52,689.87	$ 51,374.13	$ 53,589.19
ICC with multiplier (Van=1.0,this Cz =1)	$ 51,174.06	$ 60,076.39	$ 60,076.39	$ 60,014.61	$ 60,014.61	$ 51,089.19	$ 53,674.06	$ 52,689.87	$ 51,374.13	$ 53,589.19
Net Present Value [$]	$ 69,150.63	$ 69,131.88	$ 69,131.88	$ 69,099.46	$ 69,099.46	$ 69,088.28	$ 69,086.9	$ 69,074.85	$ 69,061.99	$ 69,031.12
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	53.5	82.9	82.9	83.3	83.3	53.7	50.1	51.5	53.3	50.3
Annual Energy DHW [GJ/yr]	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9
Annual Energy Space Heating [GJ/yr]	53.5	32	32	32.2	32.2	53.7	50.1	51.5	53.3	50.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	6.1	6.1	6.1	6.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	322.2	309.8	309.8	310	310	322.4	318.9	320.2	322.1	319.1
Design Heating Load [W]	19322.5	22622.3	22622.3	22676.9	22676.9	19352.1	18710.8	18984.4	19300.6	18740.4
Annual Energy Electricity [kWh/yr]	58152.1	54697.5	54697.5	54732.4	54732.4	58208.3	57201.5	57587.8	58109.7	57255.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,165.21	$ 7,676.38	$ 7,676.38	$ 7,681.32	$ 7,681.32	$ 8,173.16	$ 8,030.7	$ 8,085.36	$ 8,159.21	$ 8,038.3
Annual Energy Natural Gas [m3/yr]	3031.1	3032.3	3032.3	3032.8	3032.8	3031.4	3032.4	3032.6	3030.8	3032.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,307.51	$ 1,308.03	$ 1,308.03	$ 1,308.24	$ 1,308.24	$ 1,307.64	$ 1,308.07	$ 1,308.16	$ 1,307.38	$ 1,308.2
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21025	8860	9220	6700	7060	19081	32689	21097	22969	30745
Upgrade Package List	Pkg2332031032	Pkg2120021031	Pkg2121021031	Pkg2100021031	Pkg2101021031	Pkg2322031032	Pkg3332031032	Pkg2332032032	Pkg2342031032	Pkg3322031032
GHGI [kg/m2]	3.89	3.87	3.87	3.87	3.87	3.89	3.89	3.89	3.89	3.89
% ICC	1.2%	1.4%	1.4%	1.4%	1.4%	1.2%	1.3%	1.3%	1.2%	1.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 0	ACH 1 5	ACH 1 5	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	9	13.9	13.9	14	14	9	8.4	8.6	9	8.4
Output: MEUI [kWh/(m2 * yr)]	28.3	26.1	26.1	26.1	26.1	28.3	27.7	28	28.3	27.8
Output: Better than ERS (%)	1220.0%	1900.0%	1900.0%	1890.0%	1890.0%	1210.0%	1310.0%	1270.0%	1220.0%	1300.0%
Output: Better than Envelope (%)	3560.0%	20.0%	20.0%	20.0%	20.0%	3540.0%	3970.0%	3800.0%	3590.0%	3950.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	48753	52208	52208	52173	52173	48697	49704	49318	48796	49650
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,874.22	$ 7,361.31	$ 7,361.31	$ 7,356.39	$ 7,356.39	$ 6,866.29	$ 7,008.25	$ 6,953.78	$ 6,880.19	$ 7,000.68
Annual savings in carbon tax for electricity [$/year]	$ 24.38	$ 26.1	$ 26.1	$ 26.09	$ 26.09	$ 24.35	$ 24.85	$ 24.66	$ 24.4	$ 24.83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,898.59	$ 7,387.42	$ 7,387.42	$ 7,382.48	$ 7,382.48	$ 6,890.64	$ 7,033.1	$ 6,978.44	$ 6,904.59	$ 7,025.5
Annual savings in GHG from electricity savings [kg CO2e/year]	536.3	574.3	574.3	573.9	573.9	535.7	546.7	542.5	536.8	546.2
Annual savings in natural gas [m3/year]	23.08	23.12	23.12	23.14	23.14	23.09	23.13	23.13	23.07	23.14
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 213.82	$ 214.23	$ 214.23	$ 214.41	$ 214.41	$ 213.92	$ 214.27	$ 214.34	$ 213.72	$ 214.37
Annual savings in carbon tax for natural gas [$/year]	$ 53.37	$ 53.47	$ 53.47	$ 53.51	$ 53.51	$ 53.39	$ 53.48	$ 53.5	$ 53.34	$ 53.51
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 267.19	$ 267.71	$ 267.71	$ 267.92	$ 267.92	$ 267.32	$ 267.75	$ 267.83	$ 267.06	$ 267.88
Annual savings in GHG from natural gas savings [kg CO2e/year]	1186	1188.3	1188.3	1189.2	1189.2	1186.5	1188.5	1188.8	1185.4	1189
Net Present Value [$]	$ 69,150.63	$ 69,131.88	$ 69,131.88	$ 69,099.46	$ 69,099.46	$ 69,088.28	$ 69,086.9	$ 69,074.85	$ 69,061.99	$ 69,031.12
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.19	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	3.87	3.87	3.87	3.87	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 146.65	$ 146.65	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$.	$.	$.	$.	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	5.64	5.64	5.64	5.64	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	BC ASHP	BC ASHP	BC ASHP	BC ASHP	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	NA	NA	NA	NA	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$.	$.	$.	$.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step5 10 Lowest ICC

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 56,250.79	$ 56,335.66	$ 56,430.12	$ 56,514.99	$ 56,535.73	$ 56,545.4	$ 56,630.27	$ 56,715.06	$ 56,830.34	$ 57,766.6
ICC with multiplier (Van=1.0,this Cz =1)	$ 56,250.79	$ 56,335.66	$ 56,430.12	$ 56,514.99	$ 56,535.73	$ 56,545.4	$ 56,630.27	$ 56,715.06	$ 56,830.34	$ 57,766.6
Net Present Value [$]	$ 67,214.25	$ 67,058.47	$ 67,118.02	$ 67,193.32	$ 66,977.33	$ 67,027.39	$ 67,026.96	$ 66,930.48	$ 67,185.41	
Incremental dollars per GHG saving	$ 106.96	$ 107.	$ 107.28	$ 107.32	$ 107.28	$ 107.48	$ 107.52	$ 107.6	$ 107.82	$ 108.54
Auxiliary Energy Required Heating [GJ/yr]	56.4	56.1	56.3	56.1	56	56.3	56.1	56	55.9	54.3
Annual Energy DHW [GJ/yr]	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8
Annual Energy Space Heating [GJ/yr]	56.4	56.1	56.3	56.1	56	56.3	56.1	56	55.9	54.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	302	301.8	302	301.8	301.7	302	301.8	301.7	301.6	300
Design Heating Load [W]	19445.9	19416.3	19441.2	19412.9	19394.3	19434.7	19408.1	19391.7	19388.1	19107.8
Annual Energy Electricity [kWh/yr]	58944.6	58886	58935.5	58879.4	58842.1	58922.2	58869.8	58837	58829.7	58367
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,277.35	$ 8,269.05	$ 8,276.06	$ 8,268.12	$ 8,262.84	$ 8,274.18	$ 8,266.76	$ 8,262.12	$ 8,261.09	$ 8,195.62
Annual Energy Natural Gas [m3/yr]	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	24914	26858	25562	27506	28802	26210	28154	29450	30098	24986
Upgrade Package List	Pkg3222031032	Pkg3232031032	Pkg3223031032	Pkg3233031032	Pkg3242031032	Pkg3224031032	Pkg3234031032	Pkg3243031032	Pkg3244031032	Pkg3222032032
GHGI [kg/m2]	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18
% ICC	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%

Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%

Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	9.5	9.4	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.1
Output: MEUI [kWh/(m2 * yr)]	24.9	24.9	24.9	24.9	24.8	24.9	24.9	24.8	24.8	24.5
Output: Better than ERS (%)	1580.0%	1590.0%	1580.0%	1590.0%	1590.0%	1580.0%	1590.0%	1590.0%	1590.0%	1640.0%
Output: Better than Envelope (%)	3210.0%	3250.0%	3230.0%	3250.0%	3260.0%	3230.0%	3250.0%	3260.0%	3270.0%	3470.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	47961	48019	47970	48026	48063	47983	48036	48068	48076	48538
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,762.47	$ 6,770.74	$ 6,763.76	$ 6,771.67	$ 6,776.93	$ 6,765.63	$ 6,773.02	$ 6,777.64	$ 6,778.67	$ 6,843.91
Annual savings in carbon tax for electricity [$/year]	$ 23.98	$ 24.01	$ 23.98	$ 24.01	$ 24.03	$ 23.99	$ 24.02	$ 24.03	$ 24.04	$ 24.27
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,786.45	$ 6,794.75	$ 6,787.74	$ 6,795.68	$ 6,800.96	$ 6,789.62	$ 6,797.04	$ 6,801.68	$ 6,802.71	$ 6,868.18
Annual savings in GHG from electricity savings [kg CO2e/year]	527.6	528.2	527.7	528.3	528.7	527.8	528.4	528.8	528.8	533.9
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31
Annual savings in carbon tax for natural gas [$/year]	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Net Present Value [$]	$ 67,214.25	$ 67,280.37	$ 67,058.47	$ 67,118.02	$ 67,193.32	$ 66,977.33	$ 67,027.39	$ 67,026.96	$ 66,930.48	$ 67,185.41

ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step5 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 63,990.79	$ 64,075.66	$ 63,990.79	$ 64,075.66	$ 64,170.12	$ 63,990.79	$ 64,254.99	$ 64,170.12	$ 64,275.73	$ 64,075.66
ICC with multiplier (Van=1.0,this Cz =1)	$ 63,990.79	$ 64,075.66	$ 63,990.79	$ 64,075.66	$ 64,170.12	$ 63,990.79	$ 64,254.99	$ 64,170.12	$ 64,275.73	$ 64,075.66
Net Present Value [$]	$ 26,776.58	$ 26,978.	$ 25,612.24	$ 25,813.66	$ 26,641.8	$ 23,478.	$ 26,831.72	$ 25,477.09	$ 26,994.3	$ 23,679.42
Incremental dollars per GHG saving	$ 13.01	$ 13.02	$ 13.02	$ 13.04	$ 13.04	$ 13.05	$ 13.06	$ 13.06	$ 13.06	$ 13.06
Auxiliary Energy Required Heating [GJ/yr]	83.9	83.5	85.5	85.1	83.9	88.5	83.5	85.5	83.2	88.1
Annual Energy DHW [GJ/yr]	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4
Annual Energy Space Heating [GJ/yr]	83.9	83.5	85.5	85.1	83.9	88.5	83.5	85.5	83.2	88.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	286.2	285.8	287.8	287.4	286.1	290.8	285.7	287.7	285.5	290.4
Design Heating Load [W]	19445.9	19416.3	19721.5	19692	19441.2	20234.5	19412.9	19716.9	19394.3	20204.9
Annual Energy Electricity [kWh/yr]	79495.1	79383.9	79947.4	79836.2	79477.8	80776.4	79371.1	79930.2	79299.9	80665.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,185.24	$ 11,169.51	$ 11,249.24	$ 11,233.51	$ 11,182.79	$ 11,366.55	$ 11,167.7	$ 11,246.81	$ 11,157.62	$ 11,350.81
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	24915	26859	24699	26643	25563	24483	27507	25347	28803	26427
Upgrade Package List	Pkg3222031032	Pkg3232031032	Pkg3222021032	Pkg3232021032	Pkg3223031032	Pkg3222011032	Pkg3233031032	Pkg3223021032	Pkg3242031032	Pkg3232011032
GHGI [kg/m2]	0.53	0.53	0.53	0.53	0.53	0.54	0.53	0.53	0.53	0.54
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	14.1	14	14.4	14.3	14.1	14.9	14	14.4	14	14.8
Output: MEUI [kWh/(m2 * yr)]	22.2	22.2	22.5	22.4	22.2	23	22.2	22.5	22.1	22.9
Output: Better than ERS (%)	1760.0%	1770.0%	1710.0%	1720.0%	1760.0%	1620.0%	1770.0%	1710.0%	1780.0%	1640.0%
Output: Better than Envelope (%)	100.0%	50.0%	290.0%	240.0%	100.0%	650.0%	50.0%	290.0%	10.0%	600.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	27410	27522	26958	27069	27428	26129	27534	26975	27606	26240
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,864.85	$ 3,880.53	$ 3,801.08	$ 3,816.76	$ 3,867.29	$ 3,684.19	$ 3,882.34	$ 3,803.5	$ 3,892.38	$ 3,699.87
Annual savings in carbon tax for electricity [$/year]	$ 13.71	$ 13.76	$ 13.48	$ 13.53	$ 13.71	$ 13.06	$ 13.77	$ 13.49	$ 13.8	$ 13.12
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,878.56	$ 3,894.29	$ 3,814.56	$ 3,830.29	$ 3,881.01	$ 3,697.25	$ 3,896.1	$ 3,816.99	$ 3,906.18	$ 3,712.99
Annual savings in GHG from electricity savings [kg CO2e/year]	301.5	302.7	296.5	297.8	301.7	287.4	302.9	296.7	303.7	288.6
Annual savings in natural gas [m3/year]	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86	89.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53	$ 832.53
Annual savings in carbon tax for natural gas [$/year]	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8	$ 207.8
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32	$ 1,040.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7	4617.7
Net Present Value [$]	$ 26,776.58	$ 26,978.	$ 25,612.24	$ 25,813.66	$ 26,641.8	$ 23,478.	$ 26,831.72	$ 25,477.09	$ 26,994.3	$ 23,679.42
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 61.78	$ 61.78	$ 146.65	$ 61.78	$ 346.72	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	NA	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	NA
Exposed Floor RSI	6.34	6.34	5.64	5.64	6.34	4.67	6.34	5.64	6.34	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Vancouver: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER	VANCOUVER
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR14 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 59,674.06	$ 59,589.19	$ 61,189.87	$ 59,874.13	$ 61,105.	$ 56,335.66	$ 59,853.39	$ 57,851.47	$ 61,389.94	$ 56,250.79
ICC with multiplier (Van=1.0,this Cz =1)	$ 59,674.06	$ 59,589.19	$ 61,189.87	$ 59,874.13	$ 61,105.	$ 56,335.66	$ 59,853.39	$ 57,851.47	$ 61,389.94	$ 56,250.79
Net Present Value [$]	$ 67,417.11	$ 67,354.46	$ 67,339.34	$ 67,327.33	$ 67,282.89	$ 67,280.37	$ 67,254.58	$ 67,250.26	$ 67,244.63	$ 67,214.25
Incremental dollars per GHG saving	$ 110.22	$ 110.21	$ 111.76	$ 110.51	$ 111.73	$ 107.	$ 110.55	$ 108.56	$ 112.03	$ 106.96
Auxiliary Energy Required Heating [GJ/yr]	51.3	51.5	49.3	51.1	49.5	56.1	51.3	54.1	49.1	56.4
Annual Energy DHW [GJ/yr]	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8
Annual Energy Space Heating [GJ/yr]	51.3	51.5	49.3	51.1	49.5	56.1	51.3	54.1	49.1	56.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	297	297.2	295.	296.8	297.3	301.8	297	299.8	294.8	302
Design Heating Load [W]	18667.4	18697	18329.4	18645.5	18358.9	19416.3	18664.1	19078.2	18307.4	19445.9
Annual Energy Electricity [kWh/yr]	57536.1	57593.4	56977.5	57493.3	57032.4	58886	57529.6	58308.9	56936.6	58944.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,078.04	$ 8,086.15	$ 7,999.	$ 8,071.99	$ 8,006.77	$ 8,269.05	$ 8,077.12	$ 8,187.39	$ 7,993.21	$ 8,277.35
Annual Energy Natural Gas [m3/yr]	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6	2412.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71	$ 1,040.71
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	32690	30746	32762	34634	30818	26858	33338	26930	34706	24914
Upgrade Package List	Pkg3332031032	Pkg3322031032	Pkg3332032032	Pkg3342031032	Pkg3322032032	Pkg3232031032	Pkg3333031032	Pkg3232032032	Pkg3342032032	Pkg3222031032
GHGI [kg/m2]	3.17	3.17	3.17	3.17	3.17	3.18	3.17	3.18	3.17	3.18
% ICC	1.4%	1.4%	1.5%	1.4%	1.5%	1.3%	1.4%	1.4%	1.5%	1.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Target MEUI no cooling [kWh/(m2 * yr)]	25	25	25	25	25	25	25	25	25	25
Target MEUI cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	8.6	8.6	8.3	8.6	8.3	9.4	8.6	9.1	8.2	9.5
Output: MEUI [kWh/(m2 * yr)]	24	24.1	23.7	24	23.7	24.9	24	24.5	23.7	24.9
Output: Better than ERS (%)	1720.0%	1720.0%	1780.0%	1730.0%	1770.0%	1590.0%	1720.0%	1640.0%	1780.0%	1580.0%
Output: Better than Envelope (%)	3830.0%	3800.0%	4070.0%	3850.0%	4040.0%	3250.0%	3830.0%	3490.0%	4090.0%	3210.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	49369	49312	49928	49412	49873	48019	49376	48596	49969	47961
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,961.07	$ 6,952.99	$ 7,039.83	$ 6,967.11	$ 7,032.09	$ 6,770.74	$ 6,961.99	$ 6,852.11	$ 7,045.6	$ 6,762.47
Annual savings in carbon tax for electricity [$/year]	$ 24.68	$ 24.66	$ 24.96	$ 24.71	$ 24.94	$ 24.01	$ 24.69	$ 24.3	$ 24.98	$ 23.98
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,985.76	$ 6,977.65	$ 7,064.8	$ 6,991.81	$ 7,057.03	$ 6,794.75	$ 6,986.68	$ 6,876.4	$ 7,070.59	$ 6,786.45
Annual savings in GHG from electricity savings [kg CO2e/year]	543.1	542.4	549.2	543.5	548.6	528.2	543.1	534.6	549.7	527.6
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31
Annual savings in carbon tax for natural gas [$/year]	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Net Present Value [$]	$ 67,417.11	$ 67,354.46	$ 67,339.34	$ 67,327.33	$ 67,282.89	$ 67,280.37	$ 67,254.58	$ 67,250.26	$ 67,244.63	$ 67,214.25
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	11.19	9.02	11.19	9.02	9.02	11.19	11.19	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	5.28	7.04	5.28	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 15,787.85	$ 19,126.25	$ 15,787.85	$ 19,126.25	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 146.65	$ 146.65	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 566.8	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,842.99	$ 17,909.28	$ 17,909.28
Net Present Value [$]	$ 54,155.4	$ 54,155.4	$ 51,045.25	$ 47,915.74	$ 47,915.74	$ 44,800.66	$ 44,800.66	$ 44,800.66	$ 54,096.72	$ 54,096.72
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	198.9	198.9	203.2	207.6	207.6	212	212	212	198.9	198.9
Annual Energy DHW [GJ/yr]	113	113	113	113	113	113	113	113	113	113
Annual Energy Space Heating [GJ/yr]	198.7	198.7	203.1	207.5	207.5	211.8	211.8	211.8	198.7	198.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	471.5	471.5	475.9	480.2	480.2	484.6	484.6	484.6	471.5	471.5
Design Heating Load [W]	35180.5	35180.5	35835	36174.3	36174.3	36828.8	36828.8	36828.8	35179.9	35179.9
Annual Energy Electricity [kWh/yr]	99595.2	99595.2	100803.3	102019.2	102019.2	103229.2	103229.2	103229.2	99594	99594
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,029.41	$ 14,029.41	$ 14,200.35	$ 14,372.4	$ 14,372.4	$ 14,543.62	$ 14,543.62	$ 14,543.62	$ 14,029.24	$ 14,029.24
Annual Energy Natural Gas [m3/yr]	3033.7	3033.7	3033.7	3033.6	3033.6	3033.6	3033.6	3033.6	3033.7	3033.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,308.63	$ 1,308.63	$ 1,308.63	$ 1,308.59	$ 1,308.59	$ 1,308.59	$ 1,308.59	$ 1,308.59	$ 1,308.63	$ 1,308.63
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39781	40141	39961	40861	41221	39601	40681	41041	41941	42301
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1101011011	Pkg1110021011	Pkg1111021011	Pkg1100011011	Pkg1110011011	Pkg1111011011	Pkg1120021011	Pkg1121021011
GHGI [kg/m2]	4.17	4.17	4.18	4.19	4.19	4.2	4.2	4.2	4.17	4.17
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	33.4	33.4	34.1	34.9	34.9	35.6	35.6	35.6	33.4	33.4
Output: MEUI [kWh/(m2 * yr)]	53.3	53.3	54.1	54.8	54.8	55.5	55.5	55.5	53.3	53.3
Output: Better than ERS (%)	1140.0%	1140.0%	1250.0%	1350.0%	1350.0%	1450.0%	1450.0%	1450.0%	1140.0%	1140.0%
Output: Better than Envelope (%)	6320.0%	6320.0%	6670.0%	7030.0%	7030.0%	7390.0%	7390.0%	7390.0%	6320.0%	6320.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	29520	29520	28312	27096	27096	25886	25886	25886	29521	29521
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,162.32	$ 4,162.32	$ 3,991.98	$ 3,820.54	$ 3,820.54	$ 3,649.93	$ 3,649.93	$ 3,649.93	$ 4,162.49	$ 4,162.49
Annual savings in carbon tax for electricity [$/year]	$ 14.76	$ 14.76	$ 14.16	$ 13.55	$ 13.55	$ 12.94	$ 12.94	$ 12.94	$ 14.76	$ 14.76
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 4,177.08	$ 4,177.08	$ 4,006.13	$ 3,834.08	$ 3,834.08	$ 3,662.87	$ 3,662.87	$ 3,662.87	$ 4,177.25	$ 4,177.25
Annual savings in GHG from electricity savings [kg CO2e/year]	324.7	324.7	311.4	298.1	298.1	284.7	284.7	284.7	324.7	324.7
Annual savings in natural gas [m3/year]	23.19	23.19	23.19	23.19	23.19	23.19	23.19	23.19	23.19	23.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.85	$ 214.85	$ 214.85	$ 214.82	$ 214.82	$ 214.82	$ 214.82	$ 214.82	$ 214.85	$ 214.85
Annual savings in carbon tax for natural gas [$/year]	$ 53.63	$ 53.63	$ 53.63	$ 53.62	$ 53.62	$ 53.62	$ 53.62	$ 53.62	$ 53.63	$ 53.63
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 268.48	$ 268.48	$ 268.48	$ 268.44	$ 268.44	$ 268.44	$ 268.44	$ 268.44	$ 268.48	$ 268.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	1191.7	1191.7	1191.7	1191.5	1191.5	1191.5	1191.5	1191.5	1191.7	1191.7
Net Present Value [$]	$ 54,155.4	$ 54,155.4	$ 51,045.25	$ 47,915.74	$ 47,915.74	$ 44,800.66	$ 44,800.66	$ 44,800.66	$ 54,096.72	$ 54,096.72
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	4.67	5.64	5.64	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,369.07
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 32,586.01	$ 32,586.01	$ 32,652.3	$ 32,652.3	$ 32,586.01	$ 32,652.3	$ 32,652.3	$ 32,586.01	$ 32,586.01	$ 32,586.01
Net Present Value [$]	$ 12,069.22	$ 12,069.22	$ 12,011.09	$ 12,011.09	$ 8,953.04	$ 8,894.91	$ 8,894.91	$ 4,874.46	$ 4,874.46	$ 1,758.1
Incremental dollars per GHG saving	$ 6.45	$ 6.45	$ 6.46	$ 6.46	$ 6.46	$ 6.48	$ 6.48	$ 6.49	$ 6.49	$ 6.51
Auxiliary Energy Required Heating [GJ/yr]	227.8	227.8	227.8	227.8	232.2	232.2	232.2	237.9	237.9	242.2
Annual Energy DHW [GJ/yr]	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3
Annual Energy Space Heating [GJ/yr]	227.6	227.6	227.6	227.6	231.9	231.9	231.9	237.6	237.6	242
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	433.7	433.7	433.7	433.7	438.1	438.1	438.1	443.8	443.8	448.1
Design Heating Load [W]	35022.9	35022.9	35022.4	35022.4	35677.5	35676.9	35676.9	36016.8	36016.8	36671.3
Annual Energy Electricity [kWh/yr]	120476.2	120476.2	120474.8	120474.8	121686.6	121685.2	121685.2	123270.9	123270.9	124481.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 16,984.07	$ 16,984.07	$ 16,983.87	$ 16,983.87	$ 17,155.34	$ 17,155.14	$ 17,155.14	$ 17,379.52	$ 17,379.52	$ 17,550.8
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39783	40143	41943	42303	39963	41763	42123	40863	41223	39603
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1120021011	Pkg1121021011	Pkg1101011011	Pkg1120011011	Pkg1121011011	Pkg1110021011	Pkg1111021011	Pkg1100011011
GHGI [kg/m2]	0.8	0.8	0.8	0.8	0.81	0.81	0.81	0.82	0.82	0.83
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	38.2	38.2	38.2	38.2	39	39	39	39.9	39.9	40.7
Output: MEUI [kWh/(m2 * yr)]	47	47	47	47	47.7	47.7	47.7	48.7	48.7	49.4
Output: Better than ERS (%)	760.0%	760.0%	760.0%	760.0%	870.0%	870.0%	870.0%	1010.0%	1010.0%	1110.0%
Output: Better than Envelope (%)	8690.0%	8690.0%	8690.0%	8690.0%	9050.0%	9050.0%	9050.0%	9520.0%	9520.0%	9870.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	8639	8639	8640	8640	7429	7430	7430	5844	5844	4634
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 1,218.1	$ 1,218.1	$ 1,218.3	$ 1,218.3	$ 1,047.43	$ 1,047.63	$ 1,047.63	$ 824.05	$ 824.05	$ 653.37
Annual savings in carbon tax for electricity [$/year]	$ 4.32	$ 4.32	$ 4.32	$ 4.32	$ 3.71	$ 3.72	$ 3.72	$ 2.92	$ 2.92	$ 2.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 1,222.42	$ 1,222.42	$ 1,222.62	$ 1,222.62	$ 1,051.15	$ 1,051.34	$ 1,051.34	$ 826.97	$ 826.97	$ 655.68
Annual savings in GHG from electricity savings [kg CO2e/year]	95	95	95	95	81.7	81.7	81.7	64.3	64.3	51
Annual savings in natural gas [m3/year]	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39
Annual savings in carbon tax for natural gas [$/year]	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9
Net Present Value [$]	$ 12,069.22	$ 12,069.22	$ 12,011.09	$ 12,011.09	$ 8,953.04	$ 8,894.91	$ 8,894.91	$ 4,874.46	$ 4,874.46	$ 1,758.1
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	5.64	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC ASHP
Total increase in construction cost [$]	$ 57,514.61	$ 57,514.61	$ 57,576.39	$ 57,576.39	$ 58,081.41	$ 58,143.19	$ 59,030.42	$ 59,030.42	$ 59,092.2	$ 59,092.2
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 61,713.18	$ 61,713.18	$ 61,779.47	$ 61,779.47	$ 62,321.35	$ 62,387.64	$ 63,339.64	$ 63,339.64	$ 63,405.93	$ 63,405.93
Net Present Value [$]	$ 89,279.08	$ 89,279.08	$ 89,218.58	$ 89,218.58	$ 88,903.01	$ 88,843.05	$ 88,563.	$ 88,563.	$ 88,502.49	$ 88,502.49
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	148.1	148.1	148.1	148.1	147.4	147.4	145.2	145.2	145.2	145.2
Annual Energy DHW [GJ/yr]	113	113	113	113	113	113	113	113	113	113
Annual Energy Space Heating [GJ/yr]	70.3	70.3	70.3	70.3	70	70	69.2	69.2	69.2	69.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	365.2	365.2	365.2	365.2	364.9	364.9	364.1	364.1	364.1	364.1
Design Heating Load [W]	34110	34110	34109.4	34109.4	34036.2	34035.5	33678.6	33678.6	33678.1	33678.1
Annual Energy Electricity [kWh/yr]	70070.7	70070.7	70070.2	70070.2	69998.5	69997.8	69760.1	69760.1	69759.6	69759.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,851.69	$ 9,851.69	$ 9,851.62	$ 9,851.62	$ 9,841.47	$ 9,841.37	$ 9,807.74	$ 9,807.74	$ 9,807.67	$ 9,807.67
Annual Energy Natural Gas [m3/yr]	3033.7	3033.7	3033.7	3033.7	3033.1	3033.1	3033.7	3033.7	3033.7	3033.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,308.63	$ 1,308.63	$ 1,308.63	$ 1,308.63	$ 1,308.37	$ 1,308.37	$ 1,308.63	$ 1,308.63	$ 1,308.63	$ 1,308.63
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39820	40180	41980	42340	40540	42700	39910	40270	42070	42430
Upgrade Package List	Pkg1100021031	Pkg1101021031	Pkg1120021031	Pkg1121021031	Pkg1102021031	Pkg1122021031	Pkg1100022031	Pkg1101022031	Pkg1120022031	Pkg1121022031
GHGI [kg/m2]	3.98	3.98	3.98	3.98	3.98	3.98	3.97	3.97	3.97	3.97
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	24.9	24.9	24.9	24.9	24.8	24.7	24.4	24.4	24.4	24.4
Output: MEUI [kWh/(m2 * yr)]	34.9	34.9	34.9	34.9	34.8	34.8	34.7	34.7	34.7	34.7
Output: Better than ERS (%)	1910.0%	1910.0%	1910.0%	1910.0%	1920.0%	1920.0%	1940.0%	1940.0%	1940.0%	1940.0%
Output: Better than Envelope (%)	2150.0%	2150.0%	2150.0%	2150.0%	2090.0%	2090.0%	1910.0%	1910.0%	1910.0%	1910.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	59044	59044	59045	59045	59117	59117	59355	59355	59356	59356
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 8,325.27	$ 8,325.27	$ 8,325.34	$ 8,325.34	$ 8,335.45	$ 8,335.55	$ 8,369.07	$ 8,369.07	$ 8,369.14	$ 8,369.14
Annual savings in carbon tax for electricity [$/year]	$ 29.52	$ 29.52	$ 29.52	$ 29.52	$ 29.56	$ 29.56	$ 29.68	$ 29.68	$ 29.68	$ 29.68
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,354.8	$ 8,354.8	$ 8,354.87	$ 8,354.87	$ 8,365.01	$ 8,365.11	$ 8,398.75	$ 8,398.75	$ 8,398.82	$ 8,398.82
Annual savings in GHG from electricity savings [kg CO2e/year]	649.5	649.5	649.5	649.5	650.3	650.3	652.9	652.9	652.9	652.9
Annual savings in natural gas [m3/year]	23.19	23.19	23.19	23.19	23.17	23.17	23.19	23.19	23.19	23.19
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.85	$ 214.85	$ 214.85	$ 214.85	$ 214.65	$ 214.65	$ 214.85	$ 214.85	$ 214.85	$ 214.85
Annual savings in carbon tax for natural gas [$/year]	$ 53.63	$ 53.63	$ 53.63	$ 53.63	$ 53.58	$ 53.58	$ 53.63	$ 53.63	$ 53.63	$ 53.63
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 268.48	$ 268.48	$ 268.48	$ 268.48	$ 268.22	$ 268.22	$ 268.48	$ 268.48	$ 268.48	$ 268.48
Annual savings in GHG from natural gas savings [kg CO2e/year]	1191.7	1191.7	1191.7	1191.7	1190.6	1190.6	1191.7	1191.7	1191.7	1191.7
Net Present Value [$]	$ 89,279.08	$ 89,279.08	$ 89,218.58	$ 89,218.58	$ 88,903.01	$ 88,843.05	$ 88,563.	$ 88,563.	$ 88,502.49	$ 88,502.49
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP	BC ASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 20,644.88	$ 20,644.88	$ 20,706.66	$ 20,706.66	$ 21,211.68	$ 21,273.46	$ 24,136.67	$ 24,136.67	$ 24,136.67	$ 24,136.67
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 22,151.96	$ 22,151.96	$ 22,218.25	$ 22,218.25	$ 22,760.13	$ 22,826.42	$ 25,898.65	$ 25,898.65	$ 25,898.65	$ 25,898.65
Net Present Value [$]	$ 65,364.13	$ 65,364.13	$ 65,305.45	$ 65,305.45	$ 65,348.9	$ 65,291.32	$ 67,220.62	$ 67,220.62	$ 64,137.67	$ 64,137.67
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	177.6	177.6	177.5	177.5	176.8	176.8	170.1	170.1	174.4	174.4
Annual Energy DHW [GJ/yr]	113	113	113	113	112.9	112.9	113	113	113	113
Annual Energy Space Heating [GJ/yr]	177.5	177.5	177.4	177.4	176.7	176.7	170	170	174.3	174.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	450.2	450.2	450.2	450.2	449.4	449.4	442.7	442.7	447	447
Design Heating Load [W]	31572.9	31572.9	31572.3	31572.3	31499.1	31498.4	30614.6	30614.6	31269.1	31269.1
Annual Energy Electricity [kWh/yr]	93682.7	93682.7	93681.5	93681.5	93470.7	93469.1	91605.3	91605.3	92802.8	92802.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,192.79	$ 13,192.79	$ 13,192.62	$ 13,192.62	$ 13,162.79	$ 13,162.56	$ 12,898.83	$ 12,898.83	$ 13,068.28	$ 13,068.28
Annual Energy Natural Gas [m3/yr]	3033.3	3033.3	3033.3	3033.3	3032.6	3032.6	3033.3	3033.3	3033.3	3033.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,308.46	$ 1,308.46	$ 1,308.46	$ 1,308.46	$ 1,308.16	$ 1,308.16	$ 1,308.46	$ 1,308.46	$ 1,308.46	$ 1,308.46
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	46351	46711	48511	48871	47071	49231	49501	49861	49321	49681
Upgrade Package List	Pkg2100022011	Pkg2101022011	Pkg2120022011	Pkg2121022011	Pkg2102022011	Pkg2122022011	Pkg2200021011	Pkg2201021011	Pkg2200011011	Pkg2201011011
GHGI [kg/m2]	4.13	4.13	4.13	4.13	4.13	4.13	4.12	4.12	4.13	4.13
% ICC	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	29.8	29.8	29.8	29.8	29.7	29.7	28.5	28.5	29.3	29.3
Output: MEUI [kWh/(m2 * yr)]	49.8	49.8	49.8	49.8	49.6	49.6	48.5	48.5	49.2	49.2
Output: Better than ERS (%)	640.0%	640.0%	640.0%	640.0%	620.0%	620.0%	460.0%	460.0%	560.0%	560.0%
Output: Better than Envelope (%)	4570.0%	4570.0%	4560.0%	4560.0%	4500.0%	4500.0%	3950.0%	3950.0%	4310.0%	4310.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	35432	35432	35434	35434	35644	35646	37510	37510	36312	36312
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 4,995.98	$ 4,995.98	$ 4,996.15	$ 4,996.15	$ 5,025.87	$ 5,026.1	$ 5,288.9	$ 5,288.9	$ 5,120.05	$ 5,120.05
Annual savings in carbon tax for electricity [$/year]	$ 17.72	$ 17.72	$ 17.72	$ 17.72	$ 17.82	$ 17.82	$ 18.75	$ 18.75	$ 18.16	$ 18.16
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,013.7	$ 5,013.7	$ 5,013.87	$ 5,013.87	$ 5,043.7	$ 5,043.92	$ 5,307.65	$ 5,307.65	$ 5,138.2	$ 5,138.2
Annual savings in GHG from electricity savings [kg CO2e/year]	389.8	389.8	389.8	389.8	392.1	392.1	412.6	412.6	399.4	399.4
Annual savings in natural gas [m3/year]	23.18	23.18	23.18	23.18	23.15	23.15	23.18	23.18	23.18	23.18
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.72	$ 214.72	$ 214.72	$ 214.72	$ 214.48	$ 214.48	$ 214.72	$ 214.72	$ 214.72	$ 214.72
Annual savings in carbon tax for natural gas [$/year]	$ 53.59	$ 53.59	$ 53.59	$ 53.59	$ 53.53	$ 53.53	$ 53.59	$ 53.59	$ 53.59	$ 53.59
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 268.31	$ 268.31	$ 268.31	$ 268.31	$ 268.01	$ 268.01	$ 268.31	$ 268.31	$ 268.31	$ 268.31
Annual savings in GHG from natural gas savings [kg CO2e/year]	1190.9	1190.9	1190.9	1190.9	1189.6	1189.6	1190.9	1190.9	1190.9	1190.9
Net Present Value [$]	$ 65,364.13	$ 65,364.13	$ 65,305.45	$ 65,305.45	$ 65,348.9	$ 65,291.32	$ 67,220.62	$ 67,220.62	$ 64,137.67	$ 64,137.67
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC Effr10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC Effr17 Opt FoundationSlabBelowGrade=>BC Effr10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 37,876.67	$ 37,876.67	$ 37,938.45	$ 37,938.45	$ 38,443.47	$ 38,505.25	$ 39,392.48	$ 39,392.48	$ 39,454.26	$ 39,454.26
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 40,641.67	$ 40,641.67	$ 40,707.96	$ 40,707.96	$ 41,249.84	$ 41,316.13	$ 42,268.13	$ 42,268.13	$ 42,334.42	$ 42,334.42
Net Present Value [$]	$ 25,095.13	$ 25,095.13	$ 25,037.18	$ 25,037.18	$ 25,295.19	$ 25,239.61	$ 25,819.27	$ 25,819.27	$ 25,761.51	$ 25,761.51
Incremental dollars per GHG saving	$ 7.89	$ 7.89	$ 7.9	$ 7.9	$ 8.	$ 8.02	$ 8.19	$ 8.19	$ 8.2	$ 8.2
Auxiliary Energy Required Heating [GJ/yr]	199	199	199	199	198	198	195.9	195.9	195.9	195.9
Annual Energy DHW [GJ/yr]	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3
Annual Energy Space Heating [GJ/yr]	198.9	198.9	198.9	198.9	197.8	197.8	195.7	195.7	195.7	195.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	405	405	405	405	403.9	403.9	401.9	401.9	401.9	401.9
Design Heating Load [W]	30501.2	30501.2	30500.7	30500.7	30427.4	30426.7	30069.8	30069.8	30069.3	30069.3
Annual Energy Electricity [kWh/yr]	112500.3	112500.3	112498.8	112498.8	112202.4	112200	111630.2	111630.2	111628.7	111628.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 15,855.48	$ 15,855.48	$ 15,855.27	$ 15,855.27	$ 15,813.32	$ 15,812.98	$ 15,732.36	$ 15,732.36	$ 15,732.15	$ 15,732.15
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	49503	49863	51663	52023	50223	52527	49593	49953	51753	52113
Upgrade Package List	Pkg2200021011	Pkg2201021011	Pkg2220021011	Pkg2221021011	Pkg2202021011	Pkg2222021011	Pkg2200022011	Pkg2201022011	Pkg2220022011	Pkg2221022011
GHGI [kg/m2]	0.75	0.75	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74
% ICC	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	33.4	33.4	33.4	33.4	33.2	33.2	32.9	32.9	32.9	32.9
Output: MEUI [kWh/(m2 * yr)]	42.2	42.2	42.2	42.2	42	42	41.7	41.7	41.7	41.7
Output: Better than ERS (%)	40.0%	40.0%	40.0%	40.0%	20.0%	20.0%	30.0%	30.0%	30.0%	30.0%
Output: Better than Envelope (%)	6320.0%	6320.0%	6320.0%	6320.0%	6240.0%	6240.0%	6070.0%	6070.0%	6070.0%	6070.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	16615	16615	16616	16616	16913	16915	17485	17485	17486	17486
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,342.7	$ 2,342.7	$ 2,342.91	$ 2,342.91	$ 2,384.7	$ 2,385.04	$ 2,465.38	$ 2,465.38	$ 2,465.6	$ 2,465.6
Annual savings in carbon tax for electricity [$/year]	$ 8.31	$ 8.31	$ 8.31	$ 8.31	$ 8.46	$ 8.46	$ 8.74	$ 8.74	$ 8.74	$ 8.74
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,351.01	$ 2,351.01	$ 2,351.22	$ 2,351.22	$ 2,393.16	$ 2,393.5	$ 2,474.13	$ 2,474.13	$ 2,474.34	$ 2,474.34
Annual savings in GHG from electricity savings [kg CO2e/year]	182.8	182.8	182.8	182.8	186	186.1	192.3	192.3	192.4	192.4
Annual savings in natural gas [m3/year]	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39
Annual savings in carbon tax for natural gas [$/year]	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9
Net Present Value [$]	$ 25,095.13	$ 25,095.13	$ 25,037.18	$ 25,037.18	$ 25,295.19	$ 25,239.61	$ 25,819.27	$ 25,819.27	$ 25,761.51	$ 25,761.51
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 55,189.87	$ 55,389.94	$ 55,105.	$ 55,369.2	$ 55,569.27	$ 55,284.33	$ 55,484.48	$ 55,399.61	$ 55,684.55	$ 53,674.06
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 59,218.73	$ 59,433.41	$ 59,127.67	$ 59,411.15	$ 59,625.83	$ 59,320.09	$ 59,534.85	$ 59,443.78	$ 59,749.52	$ 57,592.27
Net Present Value [$]	$ 100,021.74	$ 99,953.18	$ 99,930.67	$ 99,861.95	$ 99,789.01	$ 99,778.36	$ 99,775.88	$ 99,702.76	$ 99,695.27	$ 99,652.36
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	84.7	84.5	84.9	84.6	84.5	84.9	84.6	84.8	84.4	87.3
Annual Energy DHW [GJ/yr]	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9
Annual Energy Space Heating [GJ/yr]	84.7	84.5	84.9	84.6	84.5	84.9	84.6	84.8	84.4	87.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	353.4	353.2	353.7	353.4	353.2	353.6	353.3	353.6	353.2	356.1
Design Heating Load [W]	23734.2	23708.6	23768.7	23730.2	23705.6	23763.3	23724.6	23755.6	23701.4	24165.5
Annual Energy Electricity [kWh/yr]	66806.1	66756	66873.4	66798.5	66750.1	66862.9	66787.5	66847.9	66741.7	67538.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,389.75	$ 9,382.66	$ 9,399.27	$ 9,388.67	$ 9,381.82	$ 9,397.79	$ 9,387.12	$ 9,395.66	$ 9,380.64	$ 9,493.37
Annual Energy Natural Gas [m3/yr]	3032.1	3031.8	3032.4	3032.1	3031.8	3032.4	3032	3032.3	3031.8	3032.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,307.94	$ 1,307.81	$ 1,308.07	$ 1,307.94	$ 1,307.81	$ 1,308.07	$ 1,307.9	$ 1,308.03	$ 1,307.81	$ 1,307.94
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	72361	74305	70417	73009	74953	71065	73657	71713	75601	72289
Upgrade Package List	Pkg3332032032	Pkg3342032032	Pkg3322032032	Pkg3333032032	Pkg3343032032	Pkg3323032032	Pkg3334032032	Pkg3324032032	Pkg3344032032	Pkg3332031032
GHGI [kg/m2]	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.96
% ICC	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Target MEUI no cooling [kWh/(m2 * yr)]	50	50	50	50	50	50	50	50	50	50
Target MEUI cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	14.2	14.2	14.3	14.2	14.2	14.2	14.2	14.2	14.2	14.7
Output: MEUI [kWh/(m2 * yr)]	33.5	33.5	33.6	33.5	33.5	33.6	33.5	33.5	33.5	34
Output: Better than ERS (%)	1650.0%	1650.0%	1640.0%	1650.0%	1650.0%	1640.0%	1650.0%	1640.0%	1650.0%	1590.0%
Output: Better than Envelope (%)	3050.0%	3070.0%	3040.0%	3060.0%	3070.0%	3040.0%	3060.0%	3040.0%	3080.0%	2840.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	62309	62359	62242	62317	62365	62252	62328	62267	62374	61577
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,785.58	$ 8,792.65	$ 8,776.09	$ 8,786.65	$ 8,793.48	$ 8,777.57	$ 8,788.21	$ 8,779.69	$ 8,794.66	$ 8,682.33
Annual savings in carbon tax for electricity [$/year]	$ 31.15	$ 31.18	$ 31.12	$ 31.16	$ 31.18	$ 31.13	$ 31.16	$ 31.13	$ 31.19	$ 30.79
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,816.74	$ 8,823.83	$ 8,807.21	$ 8,817.81	$ 8,824.66	$ 8,808.7	$ 8,819.37	$ 8,810.82	$ 8,825.85	$ 8,713.12
Annual savings in GHG from electricity savings [kg CO2e/year]	685.4	686	684.7	685.5	686	684.8	685.6	684.9	686.1	677.3
Annual savings in natural gas [m3/year]	23.13	23.12	23.14	23.13	23.12	23.14	23.13	23.14	23.12	23.13
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 214.3	$ 214.2	$ 214.41	$ 214.3	$ 214.2	$ 214.41	$ 214.27	$ 214.37	$ 214.2	$ 214.3
Annual savings in carbon tax for natural gas [$/year]	$ 53.49	$ 53.46	$ 53.51	$ 53.49	$ 53.46	$ 53.51	$ 53.48	$ 53.51	$ 53.46	$ 53.49
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 267.79	$ 267.66	$ 267.92	$ 267.79	$ 267.66	$ 267.92	$ 267.75	$ 267.88	$ 267.66	$ 267.79
Annual savings in GHG from natural gas savings [kg CO2e/year]	1188.6	1188.1	1189.2	1188.6	1188.1	1189.2	1188.5	1189	1188.1	1188.6
Net Present Value [$]	$ 100,021.74	$ 99,953.18	$ 99,930.67	$ 99,861.95	$ 99,789.01	$ 99,778.36	$ 99,775.88	$ 99,702.76	$ 99,695.27	$ 99,652.36
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 61.78	$ 346.72	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 746.13	$ 861.41	$ 861.41	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 61,105.	$ 61,189.87	$ 61,284.33	$ 61,369.2	$ 61,389.94	$ 61,399.61	$ 61,484.48	$ 61,569.27	$ 61,684.55	$ 63,990.79
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 65,565.67	$ 65,656.73	$ 65,758.09	$ 65,849.15	$ 65,871.41	$ 65,881.78	$ 65,972.85	$ 66,063.83	$ 66,187.52	$ 68,662.12
Net Present Value [$]	$ 98,223.93	$ 98,327.85	$ 98,074.73	$ 98,169.52	$ 98,266.73	$ 98,000.71	$ 98,084.37	$ 98,103.28	$ 98,011.01	$ 57,031.54
Incremental dollars per GHG saving	$ 89.98	$ 90.	$ 90.23	$ 90.25	$ 90.21	$ 90.37	$ 90.41	$ 90.46	$ 90.62	$ 12.68
Auxiliary Energy Required Heating [GJ/yr]	86.2	85.9	86.1	85.9	85.7	86.1	85.8	85.7	85.6	121.6
Annual Energy DHW [GJ/yr]	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	46.3
Annual Energy Space Heating [GJ/yr]	86.2	85.9	86.1	85.9	85.7	86.1	85.8	85.7	85.6	121.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	331.8	331.6	331.8	331.5	331.4	331.7	331.5	331.3	331.2	323.8
Design Heating Load [W]	23686.7	23652.1	23681.3	23648.2	23626.6	23673.6	23642.6	23623.6	23619.3	25073.4
Annual Energy Electricity [kWh/yr]	67223.7	67150.4	67212	67142.2	67096.4	67196	67130.5	67090.2	67081.3	89951.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,448.84	$ 9,438.47	$ 9,447.18	$ 9,437.31	$ 9,430.83	$ 9,444.92	$ 9,435.65	$ 9,429.95	$ 9,428.69	$ 12,664.84
Annual Energy Natural Gas [m3/yr]	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	70418	72362	71066	73010	74306	71714	73658	74954	75602	64515
Upgrade Package List	Pkg3322032032	Pkg3332032032	Pkg3323032032	Pkg3333032032	Pkg3342032032	Pkg3324032032	Pkg3334032032	Pkg3343032032	Pkg3344032032	Pkg3222031032
GHGI [kg/m2]	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	0.6
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	14.5	14.4	14.5	14.4	14.4	14.4	14.4	14.4	14.4	20.4
Output: MEUI [kWh/(m2 * yr)]	29.9	29.9	29.9	29.9	29.8	29.9	29.8	29.8	29.8	28.6
Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2010.0%	2000.0%	2000.0%	2010.0%	2010.0%	1970.0%
Output: Better than Envelope (%)	2930.0%	2950.0%	2940.0%	2950.0%	2970.0%	2940.0%	2960.0%	2970.0%	2980.0%	20.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	61892	61965	61903	61973	62019	61919	61985	62025	62034	39164
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,726.7	$ 8,737.04	$ 8,728.35	$ 8,738.19	$ 8,744.65	$ 8,730.61	$ 8,739.84	$ 8,745.52	$ 8,746.78	$ 5,522.07
Annual savings in carbon tax for electricity [$/year]	$ 30.95	$ 30.98	$ 30.95	$ 30.99	$ 31.01	$ 30.96	$ 30.99	$ 31.01	$ 31.02	$ 19.58
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,757.65	$ 8,768.02	$ 8,759.3	$ 8,769.18	$ 8,775.66	$ 8,761.57	$ 8,770.84	$ 8,776.54	$ 8,777.8	$ 5,541.65
Annual savings in GHG from electricity savings [kg CO2e/year]	680.8	681.6	680.9	681.7	682.2	681.1	681.8	682.3	682.4	430.8
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	89.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ 832.39
Annual savings in carbon tax for natural gas [$/year]	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ 207.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ 1,040.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	4616.9
Net Present Value [$]	$ 98,223.93	$ 98,327.85	$ 98,074.73	$ 98,169.52	$ 98,266.73	$ 98,000.71	$ 98,084.37	$ 98,103.28	$ 98,011.01	$ 57,031.54
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 30 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	5.28
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 63,990.79	$ 64,075.66	$ 63,990.79	$ 64,075.66	$ 64,170.12	$ 63,990.79	$ 64,254.99	$ 64,275.73	$ 64,170.12	$ 64,285.4
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 68,662.12	$ 68,753.18	$ 68,662.12	$ 68,753.18	$ 68,854.54	$ 68,662.12	$ 68,945.6	$ 68,967.86	$ 68,854.54	$ 68,978.23
Net Present Value [$]	$ 57,031.54	$ 57,242.09	$ 55,548.95	$ 55,759.32	$ 56,898.22	$ 52,835.73	$ 57,096.9	$ 57,264.22	$ 55,415.44	$ 56,848.12
Incremental dollars per GHG saving	$ 12.68	$ 12.69	$ 12.69	$ 12.71	$ 12.71	$ 12.72	$ 12.73	$ 12.73	$ 12.73	$ 12.73
Auxiliary Energy Required Heating [GJ/yr]	121.6	121.2	123.7	123.3	121.6	127.5	121.2	120.9	123.7	121.5
Annual Energy DHW [GJ/yr]	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3
Annual Energy Space Heating [GJ/yr]	121.6	121.2	123.7	123.3	121.6	127.5	121.2	120.9	123.6	121.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	323.8	323.4	325.9	325.5	323.8	329.7	323.4	323.1	325.8	323.7
Design Heating Load [W]	25073.4	25038.9	25425.2	25390.6	25068	26079.7	25034.9	25013.3	25419.7	25060.3
Annual Energy Electricity [kWh/yr]	89951.6	89836.8	90527.5	90412.8	89933.7	91581.4	89823.6	89750.5	90509.7	89908.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,664.84	$ 12,648.59	$ 12,746.33	$ 12,730.1	$ 12,662.3	$ 12,895.45	$ 12,646.72	$ 12,636.38	$ 12,743.81	$ 12,658.72
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	64515	66459	64299	66243	65163	64083	67107	68403	64947	65811
Upgrade Package List	Pkg3222031032	Pkg3232031032	Pkg3222021032	Pkg3232021032	Pkg3223031032	Pkg3222011032	Pkg3233031032	Pkg3242031032	Pkg3223021032	Pkg3224031032
GHGI [kg/m2]	0.6	0.6	0.6	0.6	0.6	0.61	0.6	0.6	0.6	0.6
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	20.4	20.4	20.8	20.7	20.4	21.4	20.3	20.3	20.8	20.4
Output: MEUI [kWh/(m2 * yr)]	28.6	28.5	28.9	28.8	28.5	29.5	28.5	28.4	28.9	28.5
Output: Better than ERS (%)	1970.0%	1980.0%	1920.0%	1930.0%	1970.0%	1820.0%	1980.0%	1990.0%	1920.0%	1970.0%
Output: Better than Envelope (%)	20.0%	60.0%	150.0%	110.0%	20.0%	460.0%	60.0%	80.0%	150.0%	30.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	39164	39278	38588	38702	39182	37534	39292	39365	38606	39207
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,522.07	$ 5,538.25	$ 5,440.87	$ 5,457.04	$ 5,524.59	$ 5,292.27	$ 5,540.12	$ 5,550.42	$ 5,443.38	$ 5,528.16
Annual savings in carbon tax for electricity [$/year]	$ 19.58	$ 19.64	$ 19.29	$ 19.35	$ 19.59	$ 18.77	$ 19.65	$ 19.68	$ 19.3	$ 19.6
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,541.65	$ 5,557.89	$ 5,460.16	$ 5,476.39	$ 5,544.18	$ 5,311.03	$ 5,559.76	$ 5,570.11	$ 5,462.68	$ 5,547.76
Annual savings in GHG from electricity savings [kg CO2e/year]	430.8	432.1	424.5	425.7	431	412.9	432.2	433	424.7	431.3
Annual savings in natural gas [m3/year]	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84	89.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39	$ 832.39
Annual savings in carbon tax for natural gas [$/year]	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76	$ 207.76
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15	$ 1,040.15
Annual savings in GHG from natural gas savings [kg CO2e/year]	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9	4616.9
Net Present Value [$]	$ 57,031.54	$ 57,242.09	$ 55,548.95	$ 55,759.32	$ 56,898.22	$ 52,835.73	$ 57,096.9	$ 57,264.22	$ 55,415.44	$ 56,848.12
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 61.78	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 861.41
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R36	NA	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	5.64	5.64	6.34	4.67	6.34	6.34	5.64	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Summerland: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND	SUMMERLAND
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 61,189.87	$ 61,389.94	$ 61,105.	$ 61,369.2	$ 61,569.27	$ 61,484.48	$ 61,284.33	$ 61,684.55	$ 61,399.61	$ 65,562.41
ICC with multiplier (Van=1.0,this Cz =1.073)	$ 65,656.73	$ 65,871.41	$ 65,565.67	$ 65,849.15	$ 66,063.83	$ 65,972.85	$ 65,758.09	$ 66,187.52	$ 65,881.78	$ 70,348.47
Net Present Value [$]	$ 98,327.85	$ 98,266.73	$ 98,223.93	$ 98,169.52	$ 98,103.28	$ 98,084.37	$ 98,074.73	$ 98,011.01	$ 98,000.71	$ 95,577.95
Incremental dollars per GHG saving	$ 90.	$ 90.21	$ 89.98	$ 90.25	$ 90.46	$ 90.41	$ 90.23	$ 90.62	$ 90.37	$ 95.46
Auxiliary Energy Required Heating [GJ/yr]	85.9	85.7	86.2	85.9	85.7	85.8	86.1	85.6	86.1	83.6
Annual Energy DHW [GJ/yr]	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8	89.8
Annual Energy Space Heating [GJ/yr]	85.9	85.7	86.2	85.9	85.7	85.8	86.1	85.6	86.1	83.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	331.6	331.4	331.8	331.5	331.4	331.5	331.8	331.3	331.7	329.3
Design Heating Load [W]	23652.1	23626.6	23686.7	23648.2	23623.6	23642.6	23681.3	23619.3	23673.6	23284.3
Annual Energy Electricity [kWh/yr]	67150.4	67096.4	67223.7	67142.2	67090.2	67130.5	67212	67081.3	67196	66520.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,438.47	$ 9,430.83	$ 9,448.84	$ 9,437.31	$ 9,429.95	$ 9,435.65	$ 9,447.18	$ 9,428.69	$ 9,444.92	$ 9,349.28
Annual Energy Natural Gas [m3/yr]	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2	2412.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54	$ 1,040.54
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	72362	74306	70418	73010	74954	73658	71066	75602	71714	72434
Upgrade Package List	Pkg3332032032	Pkg3342032032	Pkg3322032032	Pkg3333032032	Pkg3343032032	Pkg3334032032	Pkg3323032032	Pkg3344032032	Pkg3324032032	Pkg3332033032
GHGI [kg/m2]	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.23
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Target MEUI no cooling [kWh/(m2 * yr)]	30	30	30	30	30	30	30	30	30	30
Target MEUI cooling [kWh/(m2 * yr)]	35	35	35	35	35	35	35	35	35	35
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	14.4	14.4	14.5	14.4	14.4	14.4	14.5	14.4	14.4	14
Output: MEUI [kWh/(m2 * yr)]	29.9	29.8	29.9	29.9	29.8	29.8	29.9	29.8	29.9	29.5
Output: Better than ERS (%)	2000.0%	2010.0%	2000.0%	2000.0%	2010.0%	2000.0%	2000.0%	2010.0%	2000.0%	2060.0%
Output: Better than Envelope (%)	2950.0%	2970.0%	2930.0%	2950.0%	2970.0%	2960.0%	2940.0%	2980.0%	2940.0%	3140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	61965	62019	61892	61973	62025	61985	61903	62034	61919	62595
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,737.04	$ 8,744.65	$ 8,726.7	$ 8,738.19	$ 8,745.52	$ 8,739.84	$ 8,728.35	$ 8,746.78	$ 8,730.61	$ 8,825.91
Annual savings in carbon tax for electricity [$/year]	$ 30.98	$ 31.01	$ 30.95	$ 30.99	$ 31.01	$ 30.99	$ 30.95	$ 31.02	$ 30.96	$ 31.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,768.02	$ 8,775.66	$ 8,757.65	$ 8,769.18	$ 8,776.54	$ 8,770.84	$ 8,759.3	$ 8,777.8	$ 8,761.57	$ 8,857.21
Annual savings in GHG from electricity savings [kg CO2e/year]	681.6	682.2	680.8	681.7	682.3	681.8	680.9	682.4	681.1	688.5
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31
Annual savings in carbon tax for natural gas [$/year]	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Net Present Value [$]	$ 98,327.85	$ 98,266.73	$ 98,223.93	$ 98,169.52	$ 98,103.28	$ 98,084.37	$ 98,074.73	$ 98,011.01	$ 98,000.71	$ 95,577.95
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 7,987.17
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 146.65	$ 61.78	$ 346.72	$ 61.78	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR14	BC EffR20	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 861.41	$ 746.13	$ 861.41	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,724.33	$ 18,793.9	$ 18,793.9
Net Present Value [$]	$ 82,182.38	$ 82,182.38	$ 77,864.43	$ 73,907.72	$ 73,907.72	$ 69,513.26	$ 69,513.26	$ 69,513.26	$ 82,124.61	$ 82,124.61
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	293.6	293.6	299.6	305.1	305.1	311.2	311.2	311.2	293.5	293.5
Annual Energy DHW [GJ/yr]	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7
Annual Energy Space Heating [GJ/yr]	292.8	292.8	298.8	304.3	304.3	310.5	310.5	310.5	292.7	292.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	570.3	570.3	576.3	581.9	581.9	588	588	588	570.2	570.2
Design Heating Load [W]	47615.9	47615.9	48464.9	48797.8	48797.8	49646.9	49646.9	49646.9	47615.2	47615.2
Annual Energy Electricity [kWh/yr]	125721	125721	127398.2	128931.3	128931.3	130638.2	130638.2	130638.2	125719.4	125719.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 17,726.21	$ 17,726.21	$ 17,963.53	$ 18,180.46	$ 18,180.46	$ 18,421.99	$ 18,421.99	$ 18,421.99	$ 17,725.98	$ 17,725.98
Annual Energy Natural Gas [m3/yr]	3159.4	3159.4	3159.4	3160.6	3160.6	3160.6	3160.6	3160.6	3159.4	3159.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,362.86	$ 1,362.86	$ 1,362.86	$ 1,363.37	$ 1,363.37	$ 1,363.37	$ 1,363.37	$ 1,363.37	$ 1,362.86	$ 1,362.86
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	181	541	361	1261	1621	1	1081	1441	2341	2701
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1101011011	Pkg1110021011	Pkg1111021011	Pkg1100011011	Pkg1110011011	Pkg1111011011	Pkg1120021011	Pkg1121021011
GHGI [kg/m2]	4.49	4.49	4.5	4.51	4.51	4.53	4.53	4.53	4.49	4.49
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	49.3	49.3	50.3	51.2	51.2	52.2	52.2	52.2	49.3	49.3
Output: MEUI [kWh/(m2 * yr)]	69.9	69.9	70.9	71.9	71.9	72.9	72.9	72.9	69.9	69.9
Output: Better than ERS (%)	1190.0%	1190.0%	1310.0%	1420.0%	1420.0%	1540.0%	1540.0%	1540.0%	1190.0%	1190.0%
Output: Better than Envelope (%)	7190.0%	7190.0%	7540.0%	7860.0%	7860.0%	8220.0%	8220.0%	8220.0%	7180.0%	7180.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	40464	40464	38786	37253	37253	35546	35546	35546	40465	40465
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,705.37	$ 5,705.37	$ 5,468.88	$ 5,252.72	$ 5,252.72	$ 5,012.04	$ 5,012.04	$ 5,012.04	$ 5,705.59	$ 5,705.59
Annual savings in carbon tax for electricity [$/year]	$ 20.23	$ 20.23	$ 19.39	$ 18.63	$ 18.63	$ 17.77	$ 17.77	$ 17.77	$ 20.23	$ 20.23
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,725.6	$ 5,725.6	$ 5,488.28	$ 5,271.34	$ 5,271.34	$ 5,029.82	$ 5,029.82	$ 5,029.82	$ 5,725.83	$ 5,725.83
Annual savings in GHG from electricity savings [kg CO2e/year]	445.1	445.1	426.7	409.8	409.8	391	391	391	445.1	445.1
Annual savings in natural gas [m3/year]	23.84	23.84	23.84	23.89	23.89	23.89	23.89	23.89	23.84	23.84
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 220.9	$ 220.9	$ 220.9	$ 221.31	$ 221.31	$ 221.31	$ 221.31	$ 221.31	$ 220.9	$ 220.9
Annual savings in carbon tax for natural gas [$/year]	$ 55.13	$ 55.13	$ 55.13	$ 55.24	$ 55.24	$ 55.24	$ 55.24	$ 55.24	$ 55.13	$ 55.13
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 276.03	$ 276.03	$ 276.03	$ 276.55	$ 276.55	$ 276.55	$ 276.55	$ 276.55	$ 276.03	$ 276.03
Annual savings in GHG from natural gas savings [kg CO2e/year]	1225.2	1225.2	1225.2	1227.5	1227.5	1227.5	1227.5	1227.5	1225.2	1225.2
Net Present Value [$]	$ 82,182.38	$ 82,182.38	$ 77,864.43	$ 73,907.72	$ 73,907.72	$ 69,513.26	$ 69,513.26	$ 69,513.26	$ 82,124.61	$ 82,124.61
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	4.67	5.64	5.64	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,935.87
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 34,195.57	$ 34,195.57	$ 34,265.14	$ 34,265.14	$ 34,195.57	$ 34,265.14	$ 34,265.14	$ 34,195.57	$ 34,195.57	$ 34,833.79
Net Present Value [$]	$ 36,413.03	$ 36,413.03	$ 36,356.18	$ 36,356.18	$ 31,989.36	$ 31,932.14	$ 31,932.14	$ 27,122.92	$ 27,122.92	$ 36,761.71
Incremental dollars per GHG saving	$ 6.05	$ 6.05	$ 6.06	$ 6.06	$ 6.07	$ 6.09	$ 6.09	$ 6.1	$ 6.1	$ 6.16
Auxiliary Energy Required Heating [GJ/yr]	327.3	327.3	327.3	327.3	333.4	333.4	333.4	340.2	340.2	326
Annual Energy DHW [GJ/yr]	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4
Annual Energy Space Heating [GJ/yr]	326.1	326.1	326.1	326.1	332.3	332.3	332.3	339.1	339.1	324.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	534.4	534.4	534.4	534.4	540.6	540.6	540.6	547.4	547.4	533.1
Design Heating Load [W]	47366	47366	47365.3	47365.3	48215.1	48214.4	48214.4	48547.9	48547.9	47284.4
Annual Energy Electricity [kWh/yr]	148441.7	148441.7	148439.8	148439.8	150160	150158.2	150158.2	152050.3	152050.3	148086.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 20,941.19	$ 20,941.19	$ 20,940.92	$ 20,940.92	$ 21,184.32	$ 21,184.07	$ 21,184.07	$ 21,451.8	$ 21,451.8	$ 20,890.87
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	183	543	2343	2703	363	2163	2523	1263	1623	903
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1120021011	Pkg1121021011	Pkg1101011011	Pkg1120011011	Pkg1121011011	Pkg1110021011	Pkg1111021011	Pkg1102021011
GHGI [kg/m2]	0.99	0.99	0.99	0.99	1	1	1	1.01	1.01	0.98
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	54.9	54.9	54.9	54.9	56	56	56	57.1	57.1	54.7
Output: MEUI [kWh/(m2 * yr)]	63.9	63.9	63.9	63.9	64.9	64.9	64.9	66.1	66.1	63.7
Output: Better than ERS (%)	940.0%	940.0%	940.0%	940.0%	1060.0%	1060.0%	1060.0%	1200.0%	1200.0%	910.0%
Output: Better than Envelope (%)	9160.0%	9160.0%	9160.0%	9160.0%	9520.0%	9520.0%	9520.0%	9920.0%	9920.0%	9090.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	17743	17743	17745	17745	16025	16026	16026	14134	14134	18098
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 2,501.75	$ 2,501.75	$ 2,502.02	$ 2,502.02	$ 2,259.47	$ 2,259.72	$ 2,259.72	$ 1,992.94	$ 1,992.94	$ 2,551.89
Annual savings in carbon tax for electricity [$/year]	$ 8.87	$ 8.87	$ 8.87	$ 8.87	$ 8.01	$ 8.01	$ 8.01	$ 7.07	$ 7.07	$ 9.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 2,510.62	$ 2,510.62	$ 2,510.89	$ 2,510.89	$ 2,267.48	$ 2,267.74	$ 2,267.74	$ 2,000.	$ 2,000.	$ 2,560.94
Annual savings in GHG from electricity savings [kg CO2e/year]	195.2	195.2	195.2	195.2	176.3	176.3	176.3	155.5	155.5	199.1
Annual savings in natural gas [m3/year]	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74
Annual savings in carbon tax for natural gas [$/year]	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1
Net Present Value [$]	$ 36,413.03	$ 36,413.03	$ 36,356.18	$ 36,356.18	$ 31,989.36	$ 31,932.14	$ 31,932.14	$ 27,122.92	$ 27,122.92	$ 36,761.71
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC Effr10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt FoundationSlabBelowGrade=>BC Effr10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC Effr17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 57,514.61	$ 57,514.61	$ 57,576.39	$ 57,576.39	$ 58,081.41	$ 58,143.19	$ 59,030.42	$ 59,030.42	$ 59,092.2	$ 59,092.2
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 64,761.45	$ 64,761.45	$ 64,831.02	$ 64,831.02	$ 65,399.67	$ 65,469.23	$ 66,468.25	$ 66,468.25	$ 66,537.82	$ 66,537.82
Net Present Value [$]	$ 174,535.12	$ 174,535.12	$ 174,475.17	$ 174,475.17	$ 174,204.39	$ 174,144.8	$ 173,998.88	$ 173,998.88	$ 173,938.75	$ 173,938.75
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	220.2	220.2	220.2	220.2	219.3	219.3	216.4	216.4	216.4	216.4
Annual Energy DHW [GJ/yr]	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7
Annual Energy Space Heating [GJ/yr]	92.9	92.9	92.9	92.9	92.6	92.6	91.5	91.5	91.5	91.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	384	384	384	384	383.6	383.6	382.6	382.6	382.6	382.6
Design Heating Load [W]	46714.3	46714.3	46713.6	46713.6	46632.7	46631.8	46154.7	46154.7	46154	46154
Annual Energy Electricity [kWh/yr]	73961.4	73961.4	73960.7	73960.7	73872	73871.1	73580.9	73580.9	73580.3	73580.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,402.22	$ 10,402.22	$ 10,402.12	$ 10,402.12	$ 10,389.57	$ 10,389.45	$ 10,348.38	$ 10,348.38	$ 10,348.3	$ 10,348.3
Annual Energy Natural Gas [m3/yr]	3161.1	3161.1	3161.1	3161.1	3160.4	3160.4	3161.1	3161.1	3161.1	3161.1
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,363.59	$ 1,363.59	$ 1,363.59	$ 1,363.59	$ 1,363.29	$ 1,363.29	$ 1,363.59	$ 1,363.59	$ 1,363.59	$ 1,363.59
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	220	580	2380	2740	940	3100	310	670	2470	2830
Upgrade Package List	Pkg1100021031	Pkg1101021031	Pkg1120021031	Pkg1121021031	Pkg1102021031	Pkg1122021031	Pkg1100022031	Pkg1101022031	Pkg1120022031	Pkg1121022031
GHGI [kg/m2]	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	58	58	58	58	58	58	58	58	58	58
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	37	37	37	37	36.8	36.8	36.3	36.3	36.3	36.3
Output: MEUI [kWh/(m2 * yr)]	38.3	38.3	38.3	38.3	38.2	38.2	38	38	38	38
Output: Better than ERS (%)	2740.0%	2740.0%	2740.0%	2740.0%	2750.0%	2750.0%	2760.0%	2760.0%	2760.0%	2760.0%
Output: Better than Envelope (%)	2890.0%	2890.0%	2890.0%	2890.0%	2840.0%	2840.0%	2670.0%	2670.0%	2670.0%	2670.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	92223	92223	92224	92224	92313	92314	92604	92604	92604	92604
Annual savings in cost of elecricity (excluding carbon tax) [$/year]	$ 13,003.47	$ 13,003.47	$ 13,003.57	$ 13,003.57	$ 13,016.08	$ 13,016.2	$ 13,057.12	$ 13,057.12	$ 13,057.21	$ 13,057.21
Annual savings in carbon tax for electricity [$/year]	$ 46.11	$ 46.11	$ 46.11	$ 46.11	$ 46.16	$ 46.16	$ 46.3	$ 46.3	$ 46.3	$ 46.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 13,049.58	$ 13,049.58	$ 13,049.68	$ 13,049.68	$ 13,062.23	$ 13,062.36	$ 13,103.42	$ 13,103.42	$ 13,103.51	$ 13,103.51
Annual savings in GHG from electricity savings [kg CO2e/year]	1014.5	1014.5	1014.5	1014.5	1015.4	1015.4	1018.6	1018.6	1018.6	1018.6
Annual savings in natural gas [m3/year]	23.91	23.91	23.91	23.91	23.88	23.88	23.91	23.91	23.91	23.91
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 221.48	$ 221.48	$ 221.48	$ 221.48	$ 221.24	$ 221.24	$ 221.48	$ 221.48	$ 221.48	$ 221.48
Annual savings in carbon tax for natural gas [$/year]	$ 55.28	$ 55.28	$ 55.28	$ 55.28	$ 55.22	$ 55.22	$ 55.28	$ 55.28	$ 55.28	$ 55.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 276.76	$ 276.76	$ 276.76	$ 276.76	$ 276.46	$ 276.46	$ 276.76	$ 276.76	$ 276.76	$ 276.76
Annual savings in GHG from natural gas savings [kg CO2e/year]	1228.5	1228.5	1228.5	1228.5	1227.1	1227.1	1228.5	1228.5	1228.5	1228.5
Net Present Value [$]	$ 174,535.12	$ 174,535.12	$ 174,475.17	$ 174,475.17	$ 174,204.39	$ 174,144.8	$ 173,998.88	$ 173,998.88	$ 173,938.75	$ 173,938.75
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 28,514.61	$ 28,514.61	$ 28,514.61	$ 28,514.61	$ 28,576.39	$ 28,576.39	$ 28,576.39	$ 28,576.39	$ 29,081.41	$ 29,081.41
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 32,107.45	$ 32,107.45	$ 32,107.45	$ 32,107.45	$ 32,177.02	$ 32,177.02	$ 32,177.02	$ 32,177.02	$ 32,745.67	$ 32,745.67
Net Present Value [$]	$ 141,183.55	$ 141,183.55	$ 137,272.22	$ 137,272.22	$ 141,125.61	$ 141,125.61	$ 137,214.27	$ 137,214.27	$ 141,256.88	$ 137,348.64
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	194	194	199.4	199.4	194	194	199.4	199.4	193.1	198.5
Annual Energy DHW [GJ/yr]	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7
Annual Energy Space Heating [GJ/yr]	193.6	193.6	199.1	199.1	193.6	193.6	199.1	199.1	192.7	198.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	471.2	471.2	476.6	476.6	471.2	471.2	476.6	476.6	470.2	475.7
Design Heating Load [W]	37874	37874	38723.1	38723.1	37873.4	37873.4	38722.5	38722.5	37792.4	38641.5
Annual Energy Electricity [kWh/yr]	98182.1	98182.1	99701.4	99701.4	98180.6	98180.6	99699.9	99699.9	97935.7	99453.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,829.45	$ 13,829.45	$ 14,044.43	$ 14,044.43	$ 13,829.24	$ 13,829.24	$ 14,044.22	$ 14,044.22	$ 13,794.59	$ 14,009.4
Annual Energy Natural Gas [m3/yr]	3160.7	3160.7	3160.7	3160.7	3160.7	3160.7	3160.7	3160.7	3160	3160
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.42	$ 1,363.11	$ 1,363.11
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6697	7057	6517	6877	8857	9217	8677	9037	7417	7237
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2100011031	Pkg2101011031	Pkg2120021031	Pkg2121021031	Pkg2120011031	Pkg2121011031	Pkg2102021031	Pkg2102011031
GHGI [kg/m2]	4.31	4.31	4.32	4.32	4.31	4.31	4.32	4.32	4.31	4.32
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.6	32.6	33.5	33.5	32.6	32.6	33.5	33.5	32.4	33.3
Output: MEUI [kWh/(m2 * yr)]	53.3	53.3	54.2	54.2	53.3	53.3	54.2	54.2	53.1	54.1
Output: Better than ERS (%)	750.0%	750.0%	650.0%	650.0%	750.0%	750.0%	650.0%	650.0%	770.0%	660.0%
Output: Better than Envelope (%)	1360.0%	1360.0%	1670.0%	1670.0%	1360.0%	1360.0%	1670.0%	1670.0%	1310.0%	1620.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	68002	68002	66483	66483	68004	68004	66485	66485	68249	66731
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,588.35	$ 9,588.35	$ 9,374.13	$ 9,374.13	$ 9,588.56	$ 9,588.56	$ 9,374.34	$ 9,374.34	$ 9,623.09	$ 9,409.04
Annual savings in carbon tax for electricity [$/year]	$ 34.	$ 34.	$ 33.24	$ 33.24	$ 34.	$ 34.	$ 33.24	$ 33.24	$ 34.12	$ 33.37
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,622.35	$ 9,622.35	$ 9,407.37	$ 9,407.37	$ 9,622.57	$ 9,622.57	$ 9,407.59	$ 9,407.59	$ 9,657.22	$ 9,442.41
Annual savings in GHG from electricity savings [kg CO2e/year]	748	748	731.3	731.3	748	748	731.3	731.3	750.7	734
Annual savings in natural gas [m3/year]	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.86	23.86
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 221.34	$ 221.34	$ 221.34	$ 221.34	$ 221.34	$ 221.34	$ 221.34	$ 221.34	$ 221.1	$ 221.1
Annual savings in carbon tax for natural gas [$/year]	$ 55.25	$ 55.25	$ 55.25	$ 55.25	$ 55.25	$ 55.25	$ 55.25	$ 55.25	$ 55.19	$ 55.19
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 276.59	$ 276.59	$ 276.59	$ 276.59	$ 276.59	$ 276.59	$ 276.59	$ 276.59	$ 276.29	$ 276.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	1227.7	1227.7	1227.7	1227.7	1227.7	1227.7	1227.7	1227.7	1226.4	1226.4
Net Present Value [$]	$ 141,183.55	$ 141,183.55	$ 137,272.22	$ 137,272.22	$ 141,125.61	$ 141,125.61	$ 137,214.27	$ 137,214.27	$ 141,256.88	$ 137,348.64
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$ 61.78	$ 61.78	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	4.67	4.67	5.64	5.64	4.67	4.67	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 47,578.69	$ 47,578.69	$ 47,648.26	$ 47,648.26	$ 47,578.69	$ 47,578.69	$ 47,648.26	$ 47,648.26	$ 47,578.69	$ 47,578.69
Net Present Value [$]	$ 95,890.65	$ 95,890.65	$ 95,833.8	$ 95,833.8	$ 91,950.28	$ 91,950.28	$ 91,893.07	$ 91,893.07	$ 86,689.28	$ 86,689.28
Incremental dollars per GHG saving	$ 7.94	$ 7.94	$ 7.95	$ 7.95	$ 7.96	$ 7.96	$ 7.97	$ 7.97	$ 8.	$ 8.
Auxiliary Energy Required Heating [GJ/yr]	226.9	226.9	226.9	226.9	232.4	232.4	232.3	232.3	239.8	239.8
Annual Energy DHW [GJ/yr]	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4
Annual Energy Space Heating [GJ/yr]	226.3	226.3	226.3	226.3	231.9	231.9	231.8	231.8	239.2	239.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	434.6	434.6	434.6	434.6	440.1	440.1	440.1	440.1	447.5	447.5
Design Heating Load [W]	37687.5	37687.5	37686.8	37686.8	38536.6	38536.6	38535.9	38535.9	38869.4	38869.4
Annual Energy Electricity [kWh/yr]	120721.9	120721.9	120720	120720	122252.5	122252.5	122250.7	122250.7	124296	124296
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 17,018.83	$ 17,018.83	$ 17,018.56	$ 17,018.56	$ 17,235.41	$ 17,235.41	$ 17,235.16	$ 17,235.16	$ 17,524.57	$ 17,524.57
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6699	7059	8859	9219	6519	6879	8679	9039	7779	8139
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2120021031	Pkg2121021031	Pkg2100011031	Pkg2101011031	Pkg2120011031	Pkg2121011031	Pkg2110021031	Pkg2111021031
GHGI [kg/m2]	0.8	0.8	0.8	0.81	0.81	0.81	0.81	0.81	0.83	0.83
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	38.1	38.1	38.1	38.1	39	39	39	39	40.3	40.3
Output: MEUI [kWh/(m2 * yr)]	47.2	47.2	47.2	47.2	48.1	48.1	48.1	48.1	49.3	49.3
Output: Better than ERS (%)	1110.0%	1110.0%	1110.0%	1110.0%	990.0%	990.0%	990.0%	990.0%	840.0%	840.0%
Output: Better than Envelope (%)	3280.0%	3280.0%	3280.0%	3280.0%	3610.0%	3610.0%	3600.0%	3600.0%	4040.0%	4040.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	45463	45463	45465	45465	43932	43932	43934	43934	41889	41889
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 6,410.24	$ 6,410.24	$ 6,410.51	$ 6,410.51	$ 6,194.43	$ 6,194.43	$ 6,194.68	$ 6,194.68	$ 5,906.29	$ 5,906.29
Annual savings in carbon tax for electricity [$/year]	$ 22.73	$ 22.73	$ 22.73	$ 22.73	$ 21.97	$ 21.97	$ 21.97	$ 21.97	$ 20.94	$ 20.94
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 6,432.97	$ 6,432.97	$ 6,433.24	$ 6,433.24	$ 6,216.39	$ 6,216.39	$ 6,216.65	$ 6,216.65	$ 5,927.24	$ 5,927.24
Annual savings in GHG from electricity savings [kg CO2e/year]	500.1	500.1	500.1	500.1	483.3	483.3	483.3	483.3	460.8	460.8
Annual savings in natural gas [m3/year]	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74
Annual savings in carbon tax for natural gas [$/year]	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1
Net Present Value [$]	$ 95,890.65	$ 95,890.65	$ 95,833.8	$ 95,833.8	$ 91,950.28	$ 91,950.28	$ 91,893.07	$ 91,893.07	$ 86,689.28	$ 86,689.28
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 60,014.61	$ 60,014.61	$ 60,076.39	$ 60,076.39	$ 60,581.41	$ 60,643.19	$ 61,530.42	$ 61,530.42	$ 61,592.2	$ 61,592.2
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 67,576.45	$ 67,576.45	$ 67,646.02	$ 67,646.02	$ 68,214.67	$ 68,284.23	$ 69,283.25	$ 69,283.25	$ 69,352.82	$ 69,352.82
Net Present Value [$]	$ 180,072.2	$ 180,072.2	$ 180,011.88	$ 180,011.88	$ 179,747.49	$ 179,687.72	$ 179,543.08	$ 179,543.08	$ 179,482.58	$ 179,482.58
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	194	194	194	194	193.1	193.1	190.2	190.2	190.2	190.2
Annual Energy DHW [GJ/yr]	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7
Annual Energy Space Heating [GJ/yr]	81.6	81.6	81.6	81.6	81.3	81.3	80.3	80.3	80.3	80.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Total Energy [GJ/yr]	372.7	372.7	372.7	372.7	372.4	372.4	371.4	371.4	371.4	371.4
Design Heating Load [W]	39933.7	39933.7	39933.1	39933.1	39852.1	39851.3	39374.1	39374.1	39373.5	39373.5
Annual Energy Electricity [kWh/yr]	70840.5	70840.5	70839.9	70839.9	70748.7	70747.9	70457.2	70457.2	70456.7	70456.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 9,960.62	$ 9,960.62	$ 9,960.53	$ 9,960.53	$ 9,947.63	$ 9,947.51	$ 9,906.38	$ 9,906.38	$ 9,906.31	$ 9,906.31
Annual Energy Natural Gas [m3/yr]	3160.8	3160.8	3160.8	3160.8	3160.1	3160.1	3160.8	3160.8	3160.8	3160.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,363.46	$ 1,363.46	$ 1,363.46	$ 1,363.46	$ 1,363.16	$ 1,363.16	$ 1,363.46	$ 1,363.46	$ 1,363.46	$ 1,363.46
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6700	7060	8860	9220	7420	9580	6790	7150	8950	9310
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2120021031	Pkg2121021031	Pkg2102021031	Pkg2122021031	Pkg2100022031	Pkg2101022031	Pkg2120022031	Pkg2121022031
GHGI [kg/m2]	4.13	4.13	4.13	4.13	4.13	4.13	4.13	4.13	4.13	4.13
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	46	46	46	46	46	46	46	46	46	46
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	32.6	32.6	32.6	32.6	32.4	32.4	31.9	31.9	31.9	31.9
Output: MEUI [kWh/(m2 * yr)]	36.4	36.4	36.4	36.4	36.3	36.3	36.2	36.2	36.2	36.2
Output: Better than ERS (%)	2950.0%	2950.0%	2950.0%	2950.0%	2960.0%	2960.0%	2980.0%	2980.0%	2980.0%	2980.0%
Output: Better than Envelope (%)	1360.0%	1360.0%	1360.0%	1360.0%	1310.0%	1310.0%	1140.0%	1140.0%	1140.0%	1140.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	95344	95344	95345	95345	95436	95437	95727	95727	95728	95728
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 13,443.52	$ 13,443.52	$ 13,443.6	$ 13,443.6	$ 13,456.46	$ 13,456.57	$ 13,497.56	$ 13,497.56	$ 13,497.63	$ 13,497.63
Annual savings in carbon tax for electricity [$/year]	$ 47.67	$ 47.67	$ 47.67	$ 47.67	$ 47.72	$ 47.72	$ 47.86	$ 47.86	$ 47.86	$ 47.86
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 13,491.19	$ 13,491.19	$ 13,491.28	$ 13,491.28	$ 13,504.18	$ 13,504.29	$ 13,545.43	$ 13,545.43	$ 13,545.5	$ 13,545.5
Annual savings in GHG from electricity savings [kg CO2e/year]	1048.8	1048.8	1048.8	1048.8	1049.8	1049.8	1053	1053	1053	1053
Annual savings in natural gas [m3/year]	23.89	23.89	23.89	23.89	23.87	23.87	23.89	23.89	23.89	23.89
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 221.38	$ 221.38	$ 221.38	$ 221.38	$ 221.14	$ 221.14	$ 221.38	$ 221.38	$ 221.38	$ 221.38
Annual savings in carbon tax for natural gas [$/year]	$ 55.26	$ 55.26	$ 55.26	$ 55.26	$ 55.19	$ 55.19	$ 55.26	$ 55.26	$ 55.26	$ 55.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 276.63	$ 276.63	$ 276.63	$ 276.63	$ 276.33	$ 276.33	$ 276.63	$ 276.63	$ 276.63	$ 276.63
Annual savings in GHG from natural gas savings [kg CO2e/year]	1227.9	1227.9	1227.9	1227.9	1226.6	1226.6	1227.9	1227.9	1227.9	1227.9
Net Present Value [$]	$ 180,072.2	$ 180,072.2	$ 180,011.88	$ 180,011.88	$ 179,747.49	$ 179,687.72	$ 179,543.08	$ 179,543.08	$ 179,482.58	$ 179,482.58
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 57,766.6	$ 57,851.47	$ 57,851.47	$ 57,945.93	$ 58,030.8	$ 58,030.8	$ 58,051.54	$ 58,051.54	$ 58,061.21	$ 58,146.08
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 65,045.19	$ 65,140.76	$ 65,140.76	$ 65,247.12	$ 65,342.68	$ 65,342.68	$ 65,366.03	$ 65,366.03	$ 65,376.92	$ 65,472.49
Net Present Value [$]	$ 158,512.42	$ 158,694.12	$ 156,685.5	$ 158,374.9	$ 158,544.92	$ 156,536.85	$ 158,690.88	$ 156,682.81	$ 158,319.14	$ 158,473.28
Incremental dollars per GHG saving	$ 62.63	$ 62.64	$ 63.23	$ 62.81	$ 62.82	$ 63.42	$ 62.8	$ 63.39	$ 62.91	$ 62.94
Auxiliary Energy Required Heating [GJ/yr]	140	139.7	142.5	140	139.6	142.4	139.4	142.2	139.9	139.6
Annual Energy DHW [GJ/yr]	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9
Annual Energy Space Heating [GJ/yr]	140	139.6	142.4	139.9	139.6	142.4	139.3	142.1	139.8	139.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	389.7	389.3	392.1	389.6	389.3	392.1	389	391.8	389.5	389.2
Design Heating Load [W]	32330.8	32289.4	32745.7	32324.3	32284.6	32741	32258.7	32715	32315.1	32277.9
Annual Energy Electricity [kWh/yr]	82171.8	82068.3	82848.5	82155.6	82056.6	82836.6	81991.8	82771.8	82132.5	82039.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 11,563.99	$ 11,549.35	$ 11,659.75	$ 11,561.7	$ 11,547.69	$ 11,658.06	$ 11,538.52	$ 11,648.89	$ 11,558.43	$ 11,545.29
Annual Energy Natural Gas [m3/yr]	2520.4	2520.4	2520.4	2520.4	2520.4	2520.4	2520.4	2520.4	2520.4	2520.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21	$ 1,087.21
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	24986	26930	26714	25634	27578	27362	28874	28658	26282	28226
Upgrade Package List	Pkg3222032032	Pkg3232032032	Pkg3232022032	Pkg3223032032	Pkg3233032032	Pkg3233022032	Pkg3242032032	Pkg3242022032	Pkg3224032032	Pkg3234032032
GHGI [kg/m2]	3.46	3.46	3.47	3.46	3.46	3.47	3.46	3.47	3.46	3.46
% ICC	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	23.5	23.4	23.9	23.5	23.4	23.9	23.4	23.9	23.5	23.4
Output: MEUI [kWh/(m2 * yr)]	39.6	39.5	40	39.6	39.5	40	39.5	40	39.6	39.5
Output: Better than ERS (%)	2210.0%	2220.0%	2170.0%	2220.0%	2220.0%	2170.0%	2230.0%	2170.0%	2220.0%	2220.0%
Output: Better than Envelope (%)	1800.0%	1820.0%	1660.0%	1800.0%	1830.0%	1660.0%	1840.0%	1670.0%	1810.0%	1830.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	84013	84116	83336	84029	84128	83348	84193	83413	84052	84145
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 11,845.8	$ 11,860.4	$ 11,750.39	$ 11,848.09	$ 11,862.05	$ 11,752.07	$ 11,871.18	$ 11,761.2	$ 11,851.35	$ 11,864.44
Annual savings in carbon tax for electricity [$/year]	$ 42.01	$ 42.06	$ 41.67	$ 42.01	$ 42.06	$ 41.67	$ 42.1	$ 41.71	$ 42.03	$ 42.07
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 11,887.81	$ 11,902.46	$ 11,792.06	$ 11,890.1	$ 11,904.11	$ 11,793.74	$ 11,913.28	$ 11,802.91	$ 11,893.37	$ 11,906.52
Annual savings in GHG from electricity savings [kg CO2e/year]	924.1	925.3	916.7	924.3	925.4	916.8	926.1	917.5	924.6	925.6
Annual savings in natural gas [m3/year]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31	$ .31
Annual savings in carbon tax for natural gas [$/year]	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08	$ .08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39	$ .39
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Net Present Value [$]	$ 158,512.42	$ 158,694.12	$ 156,685.5	$ 158,374.9	$ 158,544.92	$ 156,536.85	$ 158,690.88	$ 156,682.81	$ 158,319.14	$ 158,473.28
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 146.65	$ 61.78	$ 146.65	$ 146.65	$ 346.72	$ 346.72	$ 61.78	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR20	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 746.13	$ 566.8	$ 566.8	$ 861.41	$ 861.41
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	5.64	6.34	6.34	5.64	6.34	5.64	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step5 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 65,506.6	$ 65,591.47	$ 65,685.93	$ 65,770.8	$ 65,791.54	$ 65,801.21	$ 65,791.54	$ 65,886.08	$ 65,970.87	$ 65,886.08
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 73,760.43	$ 73,856.	$ 73,962.36	$ 74,057.92	$ 74,081.27	$ 74,092.16	$ 74,081.27	$ 74,187.73	$ 74,283.2	$ 74,187.73
Net Present Value [$]	$ 115,314.07	$ 115,608.79	$ 115,193.71	$ 115,473.1	$ 115,694.83	$ 115,162.24	$ 113,678.	$ 115,420.27	$ 115,548.92	$ 113,403.43
Incremental dollars per GHG saving	$ 11.9	$ 11.91	$ 11.93	$ 11.94	$ 11.94	$ 11.95	$ 11.96	$ 11.96	$ 11.97	$ 11.98
Auxiliary Energy Required Heating [GJ/yr]	170.8	170.3	170.7	170.2	169.9	170.6	172.7	170.1	169.8	173
Annual Energy DHW [GJ/yr]	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4
Annual Energy Space Heating [GJ/yr]	170.7	170.1	170.6	170.1	169.7	170.5	172.6	170	169.7	172.8
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	374.9	374.4	374.8	374.3	374.7	374.7	376.8	374.2	373.9	377.1
Design Heating Load [W]	32330.8	32289.4	32324.3	32284.6	32258.7	32315.1	32715	32277.9	32255.2	32734.2
Annual Energy Electricity [kWh/yr]	104145.4	103997.9	104122.5	103981	103886.8	104089.9	104670.2	103956.7	103873.8	104740.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 14,673.26	$ 14,652.39	$ 14,670.02	$ 14,650.	$ 14,636.67	$ 14,665.41	$ 14,747.52	$ 14,646.56	$ 14,634.83	$ 14,757.41
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	24987	26931	25635	27579	28875	26283	28659	28227	29523	28011
Upgrade Package List	Pkg3222032032	Pkg3232032032	Pkg3223032032	Pkg3233032032	Pkg3242032032	Pkg3224032032	Pkg3242022032	Pkg3234032032	Pkg3243032032	Pkg3234022032
GHGI [kg/m2]	0.69	0.69	0.69	0.69	0.69	0.69	0.7	0.69	0.69	0.7
% ICC	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	28.7	28.6	28.7	28.6	28.5	28.6	29	28.6	28.5	29
Output: MEUI [kWh/(m2 * yr)]	37.1	37	37.1	37	37	37.1	37.5	37	37	37.5
Output: Better than ERS (%)	2330.0%	2340.0%	2330.0%	2340.0%	2350.0%	2330.0%	2290.0%	2340.0%	2350.0%	2280.0%
Output: Better than Envelope (%)	0.0%	30.0%	10.0%	40.0%	50.0%	10.0%	110.0%	40.0%	60.0%	130.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	62039	62187	62062	62204	62298	62095	61514	62228	62311	61444
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,747.53	$ 8,768.32	$ 8,750.76	$ 8,770.71	$ 8,783.99	$ 8,755.35	$ 8,673.53	$ 8,774.13	$ 8,785.82	$ 8,663.67
Annual savings in carbon tax for electricity [$/year]	$ 31.02	$ 31.09	$ 31.03	$ 31.1	$ 31.15	$ 31.05	$ 30.76	$ 31.11	$ 31.16	$ 30.72
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,778.55	$ 8,799.42	$ 8,781.79	$ 8,801.81	$ 8,815.14	$ 8,786.4	$ 8,704.29	$ 8,805.25	$ 8,816.98	$ 8,694.4
Annual savings in GHG from electricity savings [kg CO2e/year]	682.4	684.1	682.7	684.2	685.3	683	676.7	684.5	685.4	675.9
Annual savings in natural gas [m3/year]	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87	93.87
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74	$ 869.74
Annual savings in carbon tax for natural gas [$/year]	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08	$ 217.08
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82	$ 1,086.82
Annual savings in GHG from natural gas savings [kg CO2e/year]	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1	4824.1
Net Present Value [$]	$ 115,314.07	$ 115,608.79	$ 115,193.71	$ 115,473.1	$ 115,694.83	$ 115,162.24	$ 113,678.	$ 115,420.27	$ 115,548.92	$ 113,403.43
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 346.72	$ 146.65	$ 346.72	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR10	BC EffR20	BC EffR14	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 566.8	$ 861.41	$ 746.13	$ 861.41
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	5.64	6.34	6.34	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Cranbrook: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK	CRANBROOK
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 81,835.66	$ 81,750.79	$ 82,035.73	$ 82,014.99	$ 81,930.12	$ 82,130.27	$ 82,045.4	$ 82,215.06	$ 81,835.66	$ 82,330.34
ICC with multiplier (Van=1.0,this Cz =1.126)	$ 92,146.95	$ 92,051.39	$ 92,372.23	$ 92,348.88	$ 92,253.32	$ 92,478.68	$ 92,383.12	$ 92,574.16	$ 92,146.95	$ 92,703.96
Net Present Value [$]	$ 176,243.33	$ 176,229.92	$ 176,116.35	$ 176,076.11	$ 176,066.11	$ 175,976.17	$ 175,972.98	$ 175,946.39	$ 175,843.11	$ 175,842.98
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	141.8	142.2	141.6	141.8	142.1	141.7	142	141.5	144.6	141.5
Annual Energy DHW [GJ/yr]	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7	117.7
Annual Energy Space Heating [GJ/yr]	60.5	60.7	60.4	60.5	60.6	60.5	60.6	60.4	61.6	60.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	347.6	347.7	347.5	347.6	347.7	347.5	347.7	347.5	348.1	347.4
Design Heating Load [W]	34152.6	34194.1	34122	34147.9	34187.6	34141.2	34178.4	34118.4	34609	34113.3
Annual Energy Electricity [kWh/yr]	63850.4	63887.9	63822.7	63846.1	63881.9	63840.1	63873.7	63819.4	64005.9	63814.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 8,971.52	$ 8,976.82	$ 8,967.6	$ 8,970.91	$ 8,975.97	$ 8,970.06	$ 8,974.81	$ 8,967.13	$ 8,993.52	$ 8,966.48
Annual Energy Natural Gas [m3/yr]	3161.2	3161.4	3161	3161.1	3161.4	3161.1	3161.3	3160.9	3161.2	3160.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,363.63	$ 1,363.72	$ 1,363.55	$ 1,363.59	$ 1,363.72	$ 1,363.59	$ 1,363.67	$ 1,363.5	$ 1,363.63	$ 1,363.5
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	26860	24916	28804	27508	25564	28156	26212	29452	26644	30100
Upgrade Package List	Pkg3232031032	Pkg3222031032	Pkg3242031032	Pkg3232031032	Pkg3223031032	Pkg3243031032	Pkg3224031032	Pkg3243031032	Pkg3232021032	Pkg3244031032
GHGI [kg/m2]	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	29	29	29	29	29	29	29	29	29	29
Target MEUI no cooling [kWh/(m2 * yr)]	40	40	40	40	40	40	40	40	40	40
Target MEUI cooling [kWh/(m2 * yr)]	45	45	45	45	45	45	45	45	45	45
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	23.8	23.9	23.8	23.8	23.9	23.8	23.8	23.8	24.3	23.8
Output: MEUI [kWh/(m2 * yr)]	32.2	32.2	32.1	32.2	32.2	32.2	32.2	32.1	32.3	32.1
Output: Better than ERS (%)	3430.0%	3420.0%	3430.0%	3430.0%	3420.0%	3430.0%	3420.0%	3430.0%	3420.0%	3430.0%
Output: Better than Envelope (%)	1700.0%	1670.0%	1710.0%	1700.0%	1680.0%	1700.0%	1690.0%	1720.0%	1530.0%	1720.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	102334	102297	102362	102338	102303	102344	102311	102365	102179	102370
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 14,429.12	$ 14,423.83	$ 14,433.03	$ 14,429.73	$ 14,424.68	$ 14,430.57	$ 14,425.84	$ 14,433.49	$ 14,407.2	$ 14,434.14
Annual savings in carbon tax for electricity [$/year]	$ 51.17	$ 51.15	$ 51.18	$ 51.17	$ 51.15	$ 51.17	$ 51.16	$ 51.18	$ 51.09	$ 51.18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 14,480.29	$ 14,474.98	$ 14,484.21	$ 14,480.9	$ 14,475.83	$ 14,481.75	$ 14,476.99	$ 14,484.68	$ 14,458.29	$ 14,485.33
Annual savings in GHG from electricity savings [kg CO2e/year]	1125.7	1125.3	1126	1125.7	1125.3	1125.8	1125.4	1126	1124	1126.1
Annual savings in natural gas [m3/year]	23.91	23.92	23.9	23.91	23.92	23.91	23.91	23.9	23.91	23.9
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 221.52	$ 221.59	$ 221.45	$ 221.48	$ 221.59	$ 221.48	$ 221.55	$ 221.41	$ 221.52	$ 221.41
Annual savings in carbon tax for natural gas [$/year]	$ 55.29	$ 55.31	$ 55.27	$ 55.28	$ 55.31	$ 55.28	$ 55.3	$ 55.26	$ 55.29	$ 55.26
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 276.81	$ 276.89	$ 276.72	$ 276.76	$ 276.89	$ 276.76	$ 276.85	$ 276.68	$ 276.81	$ 276.68
Annual savings in GHG from natural gas savings [kg CO2e/year]	1228.7	1229	1228.3	1228.5	1229	1228.5	1228.9	1228.1	1228.7	1228.1
Net Present Value [$]	$ 176,243.33	$ 176,229.92	$ 176,116.35	$ 176,076.11	$ 176,066.11	$ 175,976.17	$ 175,972.98	$ 175,946.39	$ 175,843.11	$ 175,842.98
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67	NBC FlatCeiling [RSI]4.67
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 61.78	$ 346.72	$ 146.65	$ 61.78	$ 146.65	$ 61.78	$ 346.72	$ 146.65	$ 346.72
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR10	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 861.41	$ 861.41	$ 746.13	$ 566.8	$ 861.41
Foundation Slab on Grade	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]	NBC 936 1.96 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	5.64	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85	$ 16,690.85	$ 16,690.85	$ 17,195.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,976.86	$ 24,976.86	$ 24,976.86	$ 24,976.86	$ 24,976.86	$ 25,069.66	$ 25,069.66	$ 25,069.66	$ 25,069.66	$ 25,828.2
Net Present Value [$]	$ 112,116.69	$ 112,116.69	$ 106,749.05	$ 101,361.97	$ 101,361.97	$ 112,060.02	$ 112,060.02	$ 106,692.75	$ 106,692.75	$ 112,534.67
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	413.1	413.1	420.5	428	428	413	413	420.5	420.5	411.7
Annual Energy DHW [GJ/yr]	127.2	127.2	127.2	127.1	127.1	127.2	127.2	127.2	127.2	127.1
Annual Energy Space Heating [GJ/yr]	412	412	419.5	427	427	411.9	411.9	419.5	419.5	410.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Total Energy [GJ/yr]	699.1	699.1	706.6	714.1	714.1	699	699	706.5	706.5	697.7
Design Heating Load [W]	59981.4	59981.4	60989.7	61366.9	61366.9	59980.6	59980.6	60988.9	60988.9	59884.2
Annual Energy Electricity [kWh/yr]	158857.3	158857.3	160942.5	163038.6	163038.6	158855.3	158855.3	160940.4	160940.4	158476.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 22,414.99	$ 22,414.99	$ 22,710.05	$ 23,006.65	$ 23,006.65	$ 22,414.71	$ 22,414.71	$ 22,709.75	$ 22,709.75	$ 22,361.12
Annual Energy Natural Gas [m3/yr]	3414.8	3414.8	3414.7	3413.6	3413.6	3414.8	3414.8	3414.7	3414.7	3414.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,473.03	$ 1,473.03	$ 1,472.98	$ 1,472.51	$ 1,472.51	$ 1,473.03	$ 1,473.03	$ 1,472.98	$ 1,472.98	$ 1,472.77
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	181	541	361	1261	1621	2341	2701	2161	2521	901
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1101011011	Pkg1110021011	Pkg1111021011	Pkg1120021011	Pkg1121021011	Pkg1120011011	Pkg1121011011	Pkg1102021011
GHGI [kg/m2]	5.01	5.01	5.02	5.03	5.03	5.01	5.01	5.02	5.02	5
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	69.3	69.3	70.6	71.9	71.9	69.3	69.3	70.6	70.6	69.1
Output: MEUI [kWh/(m2 * yr)]	91.5	91.5	92.8	94.1	94.1	91.5	91.5	92.8	92.8	91.3
Output: Better than ERS (%)	1000.0%	1000.0%	1120.0%	1240.0%	1240.0%	1000.0%	1000.0%	1120.0%	1120.0%	980.0%
Output: Better than Envelope (%)	3500.0%	3500.0%	3750.0%	3990.0%	3990.0%	3500.0%	3500.0%	3750.0%	3750.0%	3460.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	52218	52218	50133	48037	48037	52220	52220	50135	50135	52599
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 7,362.77	$ 7,362.77	$ 7,068.75	$ 6,773.2	$ 6,773.2	$ 7,363.05	$ 7,363.05	$ 7,069.05	$ 7,069.05	$ 7,416.44
Annual savings in carbon tax for electricity [$/year]	$ 26.11	$ 26.11	$ 25.07	$ 24.02	$ 24.02	$ 26.11	$ 26.11	$ 25.07	$ 25.07	$ 26.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 7,388.88	$ 7,388.88	$ 7,093.82	$ 6,797.22	$ 6,797.22	$ 7,389.16	$ 7,389.16	$ 7,094.12	$ 7,094.12	$ 7,442.74
Annual savings in GHG from electricity savings [kg CO2e/year]	574.4	574.4	551.5	528.4	528.4	574.4	574.4	551.5	551.5	578.6
Annual savings in natural gas [m3/year]	25.3	25.3	25.3	25.25	25.25	25.3	25.3	25.3	25.3	25.28
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 234.39	$ 234.39	$ 234.36	$ 233.98	$ 233.98	$ 234.39	$ 234.39	$ 234.36	$ 234.36	$ 234.19
Annual savings in carbon tax for natural gas [$/year]	$ 58.5	$ 58.5	$ 58.49	$ 58.4	$ 58.4	$ 58.5	$ 58.5	$ 58.49	$ 58.49	$ 58.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.9	$ 292.9	$ 292.85	$ 292.38	$ 292.38	$ 292.9	$ 292.9	$ 292.85	$ 292.85	$ 292.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	1300.1	1300.1	1299.9	1297.8	1297.8	1300.1	1300.1	1299.9	1299.9	1298.9
Net Present Value [$]	$ 112,116.69	$ 112,116.69	$ 106,749.05	$ 101,361.97	$ 101,361.97	$ 112,060.02	$ 112,060.02	$ 106,692.75	$ 106,692.75	$ 112,534.67
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$.	$ 61.78	$ 61.78	$ 61.78	$ 61.78	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	4.67	5.64	5.64	5.64	5.64	4.67	4.67	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,369.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 45,614.34	$ 45,614.34	$ 45,707.14	$ 45,707.14	$ 45,614.34	$ 45,707.14	$ 45,707.14	$ 45,614.34	$ 45,614.34	$ 45,614.34
Net Present Value [$]	$ 61,932.25	$ 61,932.25	$ 61,876.31	$ 61,876.31	$ 56,545.62	$ 56,490.05	$ 56,490.05	$ 49,941.71	$ 49,941.71	$ 44,554.9
Incremental dollars per GHG saving	$ 5.49	$ 5.49	$ 5.5	$ 5.5	$ 5.51	$ 5.52	$ 5.52	$ 5.54	$ 5.54	$ 5.56
Auxiliary Energy Required Heating [GJ/yr]	451.8	451.8	451.8	451.8	459.2	459.2	459.2	468.6	468.6	476.1
Annual Energy DHW [GJ/yr]	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Annual Energy Space Heating [GJ/yr]	450.4	450.4	450.4	450.4	457.9	457.9	457.9	467.1	467.1	474.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Total Energy [GJ/yr]	662.8	662.8	662.8	662.8	670.4	670.4	670.4	679.6	679.6	687.1
Design Heating Load [W]	59597.6	59597.6	59596.8	59596.8	60605.9	60605.1	60605.1	60983.1	60983.1	61991.4
Annual Energy Electricity [kWh/yr]	184123.9	184123.9	184121.6	184121.6	186216.2	186213.8	186213.8	188781.4	188781.4	190873.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 25,990.22	$ 25,990.22	$ 25,989.89	$ 25,989.89	$ 26,286.28	$ 26,285.94	$ 26,285.94	$ 26,649.25	$ 26,649.25	$ 26,945.33
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	183	543	2343	2703	363	2163	2523	1263	1623	3
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1120021011	Pkg1121021011	Pkg1101011011	Pkg1120011011	Pkg1121011011	Pkg1110021011	Pkg1111021011	Pkg1100011011
GHGI [kg/m2]	1.22	1.22	1.22	1.22	1.24	1.24	1.24	1.26	1.26	1.27
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	75.8	75.8	75.8	75.8	77.1	77.1	77.1	78.7	78.7	79.9
Output: MEUI [kWh/(m2 * yr)]	85.5	85.5	85.5	85.5	86.7	86.7	86.7	88.3	88.3	89.6
Output: Better than ERS (%)	820.0%	820.0%	820.0%	820.0%	950.0%	950.0%	950.0%	1100.0%	1100.0%	1220.0%
Output: Better than Envelope (%)	4770.0%	4770.0%	4770.0%	4770.0%	5010.0%	5010.0%	5010.0%	5320.0%	5320.0%	5560.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	26952	26952	26954	26954	24859	24862	24862	22294	22294	20202
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 3,800.18	$ 3,800.18	$ 3,800.5	$ 3,800.5	$ 3,505.16	$ 3,505.5	$ 3,505.5	$ 3,143.47	$ 3,143.47	$ 2,848.44
Annual savings in carbon tax for electricity [$/year]	$ 13.48	$ 13.48	$ 13.48	$ 13.48	$ 12.43	$ 12.43	$ 12.43	$ 11.15	$ 11.15	$ 10.1
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 3,813.65	$ 3,813.65	$ 3,813.98	$ 3,813.98	$ 3,517.59	$ 3,517.93	$ 3,517.93	$ 3,154.62	$ 3,154.62	$ 2,858.54
Annual savings in GHG from electricity savings [kg CO2e/year]	296.5	296.5	296.5	296.5	273.5	273.5	273.5	245.2	245.2	222.2
Annual savings in natural gas [m3/year]	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41
Annual savings in carbon tax for natural gas [$/year]	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2
Net Present Value [$]	$ 61,932.25	$ 61,932.25	$ 61,876.31	$ 61,876.31	$ 56,545.62	$ 56,490.05	$ 56,490.05	$ 49,941.71	$ 49,941.71	$ 44,554.9
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	5.64	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 76,122.21	$ 76,122.21	$ 77,638.02	$ 77,638.02	$ 76,183.99	$ 76,183.99	$ 77,699.8	$ 77,699.8	$ 76,689.01	$ 76,750.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 114,335.56	$ 114,335.56	$ 116,612.31	$ 116,612.31	$ 114,428.35	$ 114,428.35	$ 116,705.1	$ 116,705.1	$ 115,186.89	$ 115,279.69
Net Present Value [$]	$ 238,642.24	$ 238,642.24	$ 238,586.56	$ 238,586.56	$ 238,583.02	$ 238,583.02	$ 238,527.34	$ 238,527.34	$ 238,482.53	$ 238,424.03
Incremental dollars per GHG saving	$ 1,101.62	$ 1,101.62	$ 1,029.68	$ 1,029.68	$ 1,102.52	$ 1,102.52	$ 1,030.5	$ 1,030.5	$ 1,065.13	$ 1,065.98
Auxiliary Energy Required Heating [GJ/yr]	274.1	274.1	269.2	269.2	274.1	274.1	269.2	269.2	272.8	272.8
Annual Energy DHW [GJ/yr]	127.2	127.2	127.2	127.2	127.2	127.2	127.2	127.2	127.1	127.1
Annual Energy Space Heating [GJ/yr]	150.1	150.1	148	148	150.1	150.1	148	148	149.5	149.5
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	438.9	438.9	436.9	436.9	438.9	438.9	436.9	436.9	438.3	438.3
Design Heating Load [W]	56742.4	56742.4	56077.9	56077.9	56741.7	56741.7	56077.1	56077.1	56645.3	56644.2
Annual Energy Electricity [kWh/yr]	86601.5	86601.5	86034.4	86034.4	86600.5	86600.5	86033.4	86033.4	86445.3	86444
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 12,190.8	$ 12,190.8	$ 12,110.55	$ 12,110.55	$ 12,190.66	$ 12,190.66	$ 12,110.41	$ 12,110.41	$ 12,168.69	$ 12,168.51
Annual Energy Natural Gas [m3/yr]	3414.8	3414.8	3414.8	3414.8	3414.8	3414.8	3414.8	3414.8	3414.2	3414.2
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,473.03	$ 1,472.77	$ 1,472.77
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	3466	3826	3556	3916	5626	5986	5716	6076	4186	6346
Upgrade Package List	Pkg1200021032	Pkg1201021032	Pkg1200022032	Pkg1201022032	Pkg1220021032	Pkg1221021032	Pkg1222022032	Pkg1221022032	Pkg1202021032	Pkg1222021032
GHGI [kg/m2]	4.53	4.53	4.52	4.52	4.53	4.53	4.52	4.52	4.53	4.53
% ICC	1.8%	1.8%	1.9%	1.9%	1.8%	1.8%	1.9%	1.9%	1.8%	1.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI no cooling [kWh/(m2 * yr)]	95	95	95	95	95	95	95	95	95	95
Target MEUI cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	46	46	45.2	45.2	46	46	45.2	45.2	45.8	45.8
Output: MEUI [kWh/(m2 * yr)]	47.7	47.7	47.4	47.4	47.7	47.7	47.4	47.4	47.6	47.6
Output: Better than ERS (%)	3230.0%	3230.0%	3260.0%	3260.0%	3230.0%	3230.0%	3260.0%	3260.0%	3240.0%	3240.0%
Output: Better than Envelope (%)	1040.0%	1040.0%	1200.0%	1200.0%	1040.0%	1040.0%	1200.0%	1200.0%	1080.0%	1080.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	124474	124474	125041	125041	124475	124475	125042	125042	124630	124632
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 17,550.83	$ 17,550.83	$ 17,630.8	$ 17,630.8	$ 17,550.97	$ 17,550.97	$ 17,630.94	$ 17,630.94	$ 17,572.86	$ 17,573.04
Annual savings in carbon tax for electricity [$/year]	$ 62.24	$ 62.24	$ 62.52	$ 62.52	$ 62.24	$ 62.24	$ 62.52	$ 62.52	$ 62.32	$ 62.32
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 17,613.07	$ 17,613.07	$ 17,693.32	$ 17,693.32	$ 17,613.21	$ 17,613.21	$ 17,693.46	$ 17,693.46	$ 17,635.17	$ 17,635.36
Annual savings in GHG from electricity savings [kg CO2e/year]	1369.2	1369.2	1375.5	1375.5	1369.2	1369.2	1375.5	1375.5	1370.9	1370.9
Annual savings in natural gas [m3/year]	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.28	25.28
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 234.39	$ 234.39	$ 234.39	$ 234.39	$ 234.39	$ 234.39	$ 234.39	$ 234.39	$ 234.19	$ 234.19
Annual savings in carbon tax for natural gas [$/year]	$ 58.5	$ 58.5	$ 58.5	$ 58.5	$ 58.5	$ 58.5	$ 58.5	$ 58.5	$ 58.45	$ 58.45
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.9	$ 292.9	$ 292.9	$ 292.9	$ 292.9	$ 292.9	$ 292.9	$ 292.9	$ 292.64	$ 292.64
Annual savings in GHG from natural gas savings [kg CO2e/year]	1300.1	1300.1	1300.1	1300.1	1300.1	1300.1	1300.1	1300.1	1298.9	1298.9
Net Present Value [$]	$ 238,642.24	$ 238,642.24	$ 238,586.56	$ 238,586.56	$ 238,583.02	$ 238,583.02	$ 238,527.34	$ 238,527.34	$ 238,482.53	$ 238,424.03
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	11.19	11.19	9.02	9.02	11.19	11.19	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$ 61.78	$ 61.78	$ 61.78	$ 61.78	$.	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR60
Total increase in construction cost [$]	$ 28,514.61	$ 28,514.61	$ 28,576.39	$ 28,576.39	$ 29,081.41	$ 29,143.19	$ 30,030.42	$ 30,030.42	$ 30,030.42	$ 30,030.42
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 42,828.94	$ 42,828.94	$ 42,921.74	$ 42,921.74	$ 43,680.28	$ 43,773.07	$ 45,105.69	$ 45,105.69	$ 45,105.69	$ 45,105.69
Net Present Value [$]	$ 195,414.77	$ 195,414.77	$ 195,357.92	$ 195,357.92	$ 195,807.62	$ 195,753.87	$ 197,505.19	$ 197,505.19	$ 192,607.53	$ 192,607.53
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	279.4	279.4	279.4	279.4	278.1	278.1	274.5	274.5	281.3	281.3
Annual Energy DHW [GJ/yr]	127.2	127.2	127.2	127.2	127.1	127.1	127.2	127.2	127.2	127.2
Annual Energy Space Heating [GJ/yr]	278.9	278.9	278.8	278.8	277.5	277.5	273.8	273.8	280.7	280.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Total Energy [GJ/yr]	565.9	565.9	565.9	565.9	564.6	564.6	560.9	560.9	567.8	567.8
Design Heating Load [W]	46567.2	46567.2	46566.4	46566.4	46470	46469	45902.7	45902.7	46911	46911
Annual Energy Electricity [kWh/yr]	121885.8	121885.8	121883.9	121883.9	121515.3	121512.2	120485	120485	122387.4	122387.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 17,183.53	$ 17,183.53	$ 17,183.26	$ 17,183.26	$ 17,131.1	$ 17,130.66	$ 16,985.31	$ 16,985.31	$ 17,254.5	$ 17,254.5
Annual Energy Natural Gas [m3/yr]	3414.5	3414.5	3414.5	3414.5	3413.8	3413.8	3414.5	3414.5	3414.5	3414.5
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,472.9	$ 1,472.9	$ 1,472.9	$ 1,472.9	$ 1,472.59	$ 1,472.59	$ 1,472.9	$ 1,472.9	$ 1,472.9	$ 1,472.9
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6697	7057	8857	9217	7417	9577	6787	7147	6607	6967
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2122021031	Pkg2121021031	Pkg2102021031	Pkg2122021031	Pkg2100022031	Pkg2101022031	Pkg2100012031	Pkg2101012031
GHGI [kg/m2]	4.76	4.76	4.76	4.76	4.76	4.76	4.75	4.75	4.76	4.76
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	46.9	46.9	46.9	46.9	46.7	46.7	46.1	46.1	47.2	47.2
Output: MEUI [kWh/(m2 * yr)]	69.2	69.2	69.2	69.2	69	69	68.4	68.4	69.5	69.5
Output: Better than ERS (%)	1100.0%	1100.0%	1100.0%	1100.0%	1120.0%	1120.0%	1170.0%	1170.0%	1070.0%	1070.0%
Output: Better than Envelope (%)	870.0%	870.0%	870.0%	870.0%	910.0%	910.0%	1030.0%	1030.0%	800.0%	800.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	89190	89190	89192	89192	89560	89563	90590	90590	88688	88688
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 12,575.75	$ 12,575.75	$ 12,576.02	$ 12,576.02	$ 12,627.99	$ 12,628.43	$ 12,773.26	$ 12,773.26	$ 12,505.02	$ 12,505.02
Annual savings in carbon tax for electricity [$/year]	$ 44.59	$ 44.59	$ 44.6	$ 44.6	$ 44.78	$ 44.78	$ 45.3	$ 45.3	$ 44.34	$ 44.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 12,620.34	$ 12,620.34	$ 12,620.61	$ 12,620.61	$ 12,672.77	$ 12,673.21	$ 12,818.56	$ 12,818.56	$ 12,549.37	$ 12,549.37
Annual savings in GHG from electricity savings [kg CO2e/year]	981.1	981.1	981.1	981.1	985.2	985.2	996.5	996.5	975.6	975.6
Annual savings in natural gas [m3/year]	25.29	25.29	25.29	25.29	25.26	25.26	25.29	25.29	25.29	25.29
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 234.29	$ 234.29	$ 234.29	$ 234.29	$ 234.05	$ 234.05	$ 234.29	$ 234.29	$ 234.29	$ 234.29
Annual savings in carbon tax for natural gas [$/year]	$ 58.48	$ 58.48	$ 58.48	$ 58.48	$ 58.42	$ 58.42	$ 58.48	$ 58.48	$ 58.48	$ 58.48
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.77	$ 292.77	$ 292.77	$ 292.77	$ 292.47	$ 292.47	$ 292.77	$ 292.77	$ 292.77	$ 292.77
Annual savings in GHG from natural gas savings [kg CO2e/year]	1299.5	1299.5	1299.5	1299.5	1298.2	1298.2	1299.5	1299.5	1299.5	1299.5
Net Present Value [$]	$ 195,414.77	$ 195,414.77	$ 195,357.92	$ 195,357.92	$ 195,807.62	$ 195,753.87	$ 197,505.19	$ 197,505.19	$ 192,607.53	$ 192,607.53
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 63,466.42	$ 63,466.42
Net Present Value [$]	$ 145,426.56	$ 145,426.56	$ 145,370.8	$ 145,370.8	$ 140,482.34	$ 140,482.34	$ 140,426.58	$ 140,426.58	$ 133,343.99	$ 133,343.99
Incremental dollars per GHG saving	$ 7.11	$ 7.11	$ 7.12	$ 7.12	$ 7.14	$ 7.14	$ 7.15	$ 7.15	$ 7.17	$ 7.17
Auxiliary Energy Required Heating [GJ/yr]	317.9	317.9	317.9	317.9	324.7	324.7	324.7	324.7	334.7	334.7
Annual Energy DHW [GJ/yr]	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Annual Energy Space Heating [GJ/yr]	317	317	317	317	323.9	323.9	323.9	323.9	333.9	333.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Total Energy [GJ/yr]	529.5	529.5	529.5	529.5	536.4	536.4	536.4	536.4	546.4	546.4
Design Heating Load [W]	46268.8	46268.8	46268	46268	47277.1	47277.1	47276.3	47276.3	47654.3	47654.3
Annual Energy Electricity [kWh/yr]	147075.2	147075.2	147072.9	147072.9	148995.7	148995.7	148993.4	148993.4	151768.5	151768.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 20,747.83	$ 20,747.83	$ 20,747.5	$ 20,747.5	$ 21,019.58	$ 21,019.58	$ 21,019.25	$ 21,019.25	$ 21,411.93	$ 21,411.93
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	6699	7059	8859	9219	6519	6879	8679	9039	7779	8139
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2120021031	Pkg2121021031	Pkg2100011031	Pkg2101011031	Pkg2120011031	Pkg2121011031	Pkg2110021031	Pkg2111021031
GHGI [kg/m2]	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99	1.01	1.01
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	53.4	53.4	53.4	53.4	54.5	54.5	54.5	54.5	56.2	56.2
Output: MEUI [kWh/(m2 * yr)]	63.1	63.1	63.1	63.1	64.2	64.2	64.2	64.2	65.9	65.9
Output: Better than ERS (%)	1350.0%	1350.0%	1350.0%	1350.0%	1240.0%	1240.0%	1240.0%	1240.0%	1080.0%	1080.0%
Output: Better than Envelope (%)	390.0%	390.0%	390.0%	390.0%	610.0%	610.0%	610.0%	610.0%	940.0%	940.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	64000	64000	64003	64003	62080	62080	62082	62082	59307	59307
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,024.04	$ 9,024.04	$ 9,024.37	$ 9,024.37	$ 8,753.25	$ 8,753.25	$ 8,753.58	$ 8,753.58	$ 8,362.29	$ 8,362.29
Annual savings in carbon tax for electricity [$/year]	$ 32.	$ 32.	$ 32.	$ 32.	$ 31.04	$ 31.04	$ 31.04	$ 31.04	$ 29.65	$ 29.65
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,056.04	$ 9,056.04	$ 9,056.37	$ 9,056.37	$ 8,784.29	$ 8,784.29	$ 8,784.62	$ 8,784.62	$ 8,391.94	$ 8,391.94
Annual savings in GHG from electricity savings [kg CO2e/year]	704	704	704	704	682.9	682.9	682.9	682.9	652.4	652.4
Annual savings in natural gas [m3/year]	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41
Annual savings in carbon tax for natural gas [$/year]	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2
Net Present Value [$]	$ 145,426.56	$ 145,426.56	$ 145,370.8	$ 145,370.8	$ 140,482.34	$ 140,482.34	$ 140,426.58	$ 140,426.58	$ 133,343.99	$ 133,343.99
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 82,674.06	$ 84,189.87	$ 82,874.13	$ 82,589.19	$ 84,389.94	$ 84,105.	$ 82,853.39	$ 84,369.2	$ 82,768.52	$ 83,053.46
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 124,176.44	$ 126,453.18	$ 124,476.94	$ 124,048.96	$ 126,753.69	$ 126,325.71	$ 124,445.79	$ 126,722.54	$ 124,318.32	$ 124,746.3
Net Present Value [$]	$ 254,539.3	$ 254,495.86	$ 254,461.07	$ 254,458.7	$ 254,417.63	$ 254,415.26	$ 254,378.6	$ 254,334.97	$ 254,305.66	$ 254,296.71
Incremental dollars per GHG saving	$ 494.17	$ 484.97	$ 492.71	$ 497.53	$ 483.61	$ 488.13	$ 494.94	$ 485.72	$ 497.71	$ 492.9
Auxiliary Energy Required Heating [GJ/yr]	214.4	209.8	214.1	214.9	209.4	210.3	214.4	209.7	214.8	214
Annual Energy DHW [GJ/yr]	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1
Annual Energy Space Heating [GJ/yr]	118.6	116.6	118.5	118.9	116.4	116.8	118.6	116.5	118.8	118.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	407.5	405.5	407.3	407.7	405.3	405.7	407.5	405.4	407.7	407.3
Design Heating Load [W]	44606.8	43942.3	44570	44656.4	43905.5	43991.9	44601.2	43936.6	44648.6	44565.7
Annual Energy Electricity [kWh/yr]	77885.5	77313.6	77838.8	77948.8	77266.9	77376.9	77878.3	77306.4	77938.9	77833.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,957.48	$ 10,876.56	$ 10,950.88	$ 10,966.44	$ 10,869.95	$ 10,885.52	$ 10,956.46	$ 10,875.54	$ 10,965.04	$ 10,950.1
Annual Energy Natural Gas [m3/yr]	3413.6	3413.6	3413.4	3413.9	3413.4	3413.9	3413.6	3413.6	3413.8	3413.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,472.51	$ 1,472.51	$ 1,472.42	$ 1,472.64	$ 1,472.42	$ 1,472.64	$ 1,472.51	$ 1,472.51	$ 1,472.59	$ 1,472.38
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	21028	21100	22972	19084	23044	19156	21676	21748	19732	23620
Upgrade Package List	Pkg2312031032	Pkg2320232032	Pkg2342031032	Pkg2322031032	Pkg2342032032	Pkg2322032032	Pkg2333031032	Pkg2333032032	Pkg2323031032	Pkg2343031032
GHGI [kg/m2]	4.47	4.46	4.47	4.47	4.46	4.46	4.47	4.46	4.47	4.47
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5
Target MEUI no cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target MEUI cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	36	35.2	35.9	36.1	35.2	35.3	36	35.2	36.1	35.9
Output: MEUI [kWh/(m2 * yr)]	42.4	42.1	42.4	42.5	42.1	42.1	42.4	42.1	42.5	42.4
Output: Better than ERS (%)	3710.0%	3740.0%	3710.0%	3710.0%	3740.0%	3740.0%	3710.0%	3740.0%	3710.0%	3710.0%
Output: Better than Envelope (%)	2990.0%	3140.0%	3000.0%	2970.0%	3150.0%	3130.0%	2990.0%	3140.0%	2980.0%	3000.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	133190	133762	133237	133127	133809	133699	133197	133769	133137	133242
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 18,779.79	$ 18,860.43	$ 18,786.37	$ 18,770.86	$ 18,867.01	$ 18,851.5	$ 18,780.81	$ 18,861.44	$ 18,772.26	$ 18,787.15
Annual savings in carbon tax for electricity [$/year]	$ 66.6	$ 66.88	$ 66.62	$ 66.56	$ 66.9	$ 66.85	$ 66.6	$ 66.88	$ 66.57	$ 66.62
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 18,846.38	$ 18,927.31	$ 18,852.99	$ 18,837.43	$ 18,933.92	$ 18,918.35	$ 18,847.4	$ 18,928.33	$ 18,838.83	$ 18,853.77
Annual savings in GHG from electricity savings [kg CO2e/year]	1465.1	1471.4	1465.6	1464.4	1471.9	1470.7	1465.2	1471.5	1464.5	1465.7
Annual savings in natural gas [m3/year]	25.25	25.25	25.25	25.27	25.25	25.27	25.25	25.25	25.26	25.24
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 233.98	$ 233.98	$ 233.91	$ 234.08	$ 233.91	$ 234.08	$ 233.98	$ 233.98	$ 234.05	$ 233.88
Annual savings in carbon tax for natural gas [$/year]	$ 58.4	$ 58.4	$ 58.38	$ 58.43	$ 58.38	$ 58.43	$ 58.4	$ 58.4	$ 58.42	$ 58.37
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.38	$ 292.38	$ 292.29	$ 292.51	$ 292.29	$ 292.51	$ 292.38	$ 292.38	$ 292.47	$ 292.25
Annual savings in GHG from natural gas savings [kg CO2e/year]	1297.8	1297.8	1297.4	1298.4	1297.4	1298.4	1297.8	1297.8	1298.2	1297.2
Net Present Value [$]	$ 254,539.3	$ 254,495.86	$ 254,461.07	$ 254,458.7	$ 254,417.63	$ 254,415.26	$ 254,378.6	$ 254,334.97	$ 254,305.66	$ 254,296.71
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	11.19	9.02	9.02	11.19	11.19	9.02	11.19	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR50	CeilR60	CeilR60	CeilR50	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 2,098.82	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 146.65	$ 346.72	$ 61.78	$ 346.72	$ 61.78	$ 146.65	$ 146.65	$ 61.78	$ 346.72
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 746.13	$ 746.13
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60
Total increase in construction cost [$]	$ 53,589.19	$ 53,674.06	$ 53,768.52	$ 53,853.39	$ 53,874.13	$ 53,883.8	$ 53,968.67	$ 54,053.46	$ 54,168.74	$ 55,105.
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 80,490.96	$ 80,618.44	$ 80,760.32	$ 80,887.79	$ 80,918.94	$ 80,933.47	$ 81,060.94	$ 81,188.3	$ 81,361.45	$ 82,767.71
Net Present Value [$]	$ 231,216.99	$ 231,472.51	$ 231,090.42	$ 231,332.25	$ 231,542.35	$ 231,050.55	$ 231,289.09	$ 231,392.97	$ 231,319.5	$ 233,009.07
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	197.9	197.5	197.9	197.4	197.1	197.8	197.3	197.1	197	193.3
Annual Energy DHW [GJ/yr]	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1
Annual Energy Space Heating [GJ/yr]	197.8	197.3	197.7	197.3	197	197.6	197.2	196.9	196.9	193.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	480.8	480.3	480.7	480.3	479.9	480.6	480.2	479.9	479.8	476.2
Design Heating Load [W]	38556.2	38506.6	38548.4	38500.9	38469.8	38537.4	38492.9	38465.5	38459.3	37891.6
Annual Energy Electricity [kWh/yr]	98241.9	98110.6	98221.4	98095.4	98006.4	98192.4	98067.7	97995.1	97978.8	96957
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,837.91	$ 13,819.33	$ 13,835.01	$ 13,817.18	$ 13,804.59	$ 13,830.91	$ 13,813.26	$ 13,802.99	$ 13,800.69	$ 13,656.1
Annual Energy Natural Gas [m3/yr]	3413.7	3413.4	3413.7	3413.4	3413.2	3413.6	3413.3	3413.1	3413.1	3413.7
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,472.55	$ 1,472.42	$ 1,472.55	$ 1,472.42	$ 1,472.34	$ 1,472.51	$ 1,472.38	$ 1,472.29	$ 1,472.29	$ 1,472.55
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	30745	32689	31393	33337	34633	32041	33985	35281	35929	30817
Upgrade Package List	Pkg3322031032	Pkg3332031032	Pkg3323031032	Pkg3333031032	Pkg3342031032	Pkg3324031032	Pkg3334031032	Pkg3343031032	Pkg3344031032	Pkg3322032032
GHGI [kg/m2]	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.59
% ICC	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.2	33.2	33.2	33.1	33.1	33.2	33.1	33.1	33.1	32.5
Output: MEUI [kWh/(m2 * yr)]	54.9	54.8	54.9	54.8	54.8	54.9	54.8	54.8	54.7	54.1
Output: Better than ERS (%)	2430.0%	2440.0%	2440.0%	2440.0%	2450.0%	2440.0%	2440.0%	2450.0%	2450.0%	2510.0%
Output: Better than Envelope (%)	3530.0%	3540.0%	3530.0%	3550.0%	3560.0%	3530.0%	3550.0%	3560.0%	3560.0%	3680.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	112834	112965	112854	112980	113069	112883	113008	113080	113097	114118
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 15,909.54	$ 15,928.05	$ 15,912.43	$ 15,930.19	$ 15,942.74	$ 15,916.52	$ 15,934.1	$ 15,944.34	$ 15,946.63	$ 16,090.71
Annual savings in carbon tax for electricity [$/year]	$ 56.42	$ 56.48	$ 56.43	$ 56.49	$ 56.53	$ 56.44	$ 56.5	$ 56.54	$ 56.55	$ 57.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 15,965.95	$ 15,984.53	$ 15,968.86	$ 15,986.68	$ 15,999.28	$ 15,972.96	$ 15,990.6	$ 16,000.88	$ 16,003.18	$ 16,147.77
Annual savings in GHG from electricity savings [kg CO2e/year]	1241.2	1242.6	1241.4	1242.8	1243.8	1241.7	1243.1	1243.9	1244.1	1255.3
Annual savings in natural gas [m3/year]	25.26	25.25	25.26	25.25	25.24	25.25	25.24	25.24	25.24	25.26
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 234.01	$ 233.91	$ 234.01	$ 233.91	$ 233.84	$ 233.98	$ 233.88	$ 233.81	$ 233.81	$ 234.01
Annual savings in carbon tax for natural gas [$/year]	$ 58.41	$ 58.38	$ 58.41	$ 58.38	$ 58.37	$ 58.4	$ 58.37	$ 58.36	$ 58.36	$ 58.41
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.42	$ 292.29	$ 292.42	$ 292.29	$ 292.21	$ 292.38	$ 292.25	$ 292.16	$ 292.16	$ 292.42
Annual savings in GHG from natural gas savings [kg CO2e/year]	1298	1297.4	1298	1297.4	1297	1297.8	1297.2	1296.8	1296.8	1298
Net Present Value [$]	$ 231,216.99	$ 231,472.51	$ 231,090.42	$ 231,332.25	$ 231,542.35	$ 231,050.55	$ 231,289.09	$ 231,392.97	$ 231,319.5	$ 233,009.07
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	11.19
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 63,990.79	$ 64,075.66	$ 63,990.79	$ 64,170.12	$ 64,075.66	$ 64,254.99	$ 64,275.73	$ 64,285.4	$ 64,170.12	$ 63,990.79
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 96,114.17	$ 96,241.64	$ 96,114.17	$ 96,383.52	$ 96,241.64	$ 96,510.99	$ 96,542.15	$ 96,556.67	$ 96,383.52	$ 96,114.17
Net Present Value [$]	$ 177,252.78	$ 177,680.24	$ 174,702.07	$ 177,153.06	$ 175,129.53	$ 177,559.89	$ 177,867.44	$ 177,150.62	$ 174,601.98	$ 170,052.36
Incremental dollars per GHG saving	$ 10.37	$ 10.38	$ 10.39	$ 10.4	$ 10.4	$ 10.41	$ 10.41	$ 10.42	$ 10.42	$ 10.42
Auxiliary Energy Required Heating [GJ/yr]	246.4	245.7	250	246.3	249.3	245.6	245.2	246.2	249.9	256.5
Annual Energy DHW [GJ/yr]	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Annual Energy Space Heating [GJ/yr]	246.2	245.5	249.8	246.1	249	245.4	244.9	245.9	249.6	256.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	454.6	453.9	458.1	454.5	457.4	453.8	453.3	454.3	458	464.6
Design Heating Load [W]	39802.3	39752.7	40344.2	39794.5	40294.6	39747.1	39715.9	39783.5	40336.4	41352.5
Annual Energy Electricity [kWh/yr]	126269.8	126070.8	127260.6	126238.9	127061.6	126047.9	125920.4	126195.1	127229.8	129066.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 17,803.86	$ 17,775.7	$ 17,944.06	$ 17,799.49	$ 17,915.9	$ 17,772.46	$ 17,754.42	$ 17,793.29	$ 17,939.7	$ 18,199.62
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	24915	26859	24699	25563	26643	27507	28803	26211	25347	24483
Upgrade Package List	Pkg3222031032	Pkg3232031032	Pkg3222021032	Pkg3223031032	Pkg3232021032	Pkg3233031032	Pkg3242031032	Pkg3224031032	Pkg3223021032	Pkg3222011032
GHGI [kg/m2]	0.84	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.85	0.86
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	41.4	41.2	42	41.4	41.8	41.2	41.2	41.3	41.9	43.1
Output: MEUI [kWh/(m2 * yr)]	50.5	50.4	51.1	50.5	51	50.4	50.3	50.5	51.1	52.2
Output: Better than ERS (%)	2580.0%	2590.0%	2520.0%	2580.0%	2530.0%	2590.0%	2600.0%	2580.0%	2520.0%	2410.0%
Output: Better than Envelope (%)	1950.0%	1970.0%	1830.0%	1950.0%	1850.0%	1970.0%	1980.0%	1950.0%	1830.0%	1610.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	84806	85005	83815	84837	84014	85028	85155	84880	83846	82009
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 11,957.6	$ 11,985.66	$ 11,817.9	$ 11,961.96	$ 11,845.96	$ 11,988.89	$ 12,006.87	$ 11,968.14	$ 11,822.24	$ 11,563.24
Annual savings in carbon tax for electricity [$/year]	$ 42.4	$ 42.5	$ 41.91	$ 42.42	$ 42.01	$ 42.51	$ 42.58	$ 42.44	$ 41.92	$ 41.
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 12,000.01	$ 12,028.17	$ 11,859.81	$ 12,004.38	$ 11,887.97	$ 12,031.41	$ 12,049.45	$ 12,010.58	$ 11,864.17	$ 11,604.25
Annual savings in GHG from electricity savings [kg CO2e/year]	932.9	935.1	922	933.2	924.2	935.3	936.7	933.7	922.3	902.1
Annual savings in natural gas [m3/year]	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93	101.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41	$ 944.41
Annual savings in carbon tax for natural gas [$/year]	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72	$ 235.72
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13	$ 1,180.13
Annual savings in GHG from natural gas savings [kg CO2e/year]	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2	5238.2
Net Present Value [$]	$ 177,252.78	$ 177,680.24	$ 174,702.07	$ 177,153.06	$ 175,129.53	$ 177,559.89	$ 177,867.44	$ 177,150.62	$ 174,601.98	$ 170,052.36
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 61.78	$ 146.65	$ 146.65	$ 346.72	$ 61.78	$ 61.78	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR10	BC EffR20	BC EffR14	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 566.8	$ 861.41	$ 746.13	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R32	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R32	NA
Exposed Floor RSI	6.34	6.34	5.64	6.34	5.64	6.34	6.34	6.34	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort St John: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN	FORTSTJOHN
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 85,374.13	$ 86,889.94	$ 85,174.06	$ 86,689.87	$ 85,089.19	$ 86,605.	$ 85,553.46	$ 87,069.27	$ 85,353.39	$ 86,869.2
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 128,231.94	$ 130,508.69	$ 127,931.44	$ 130,208.18	$ 127,803.96	$ 130,080.71	$ 128,501.3	$ 130,778.04	$ 128,200.79	$ 130,477.54
Net Present Value [$]	$ 258,886.03	$ 258,855.	$ 258,847.59	$ 258,816.56	$ 258,768.39	$ 258,736.99	$ 258,720.58	$ 258,689.73	$ 258,687.8	$ 258,656.77
Incremental dollars per GHG saving	$ 430.75	$ 424.89	$ 433.24	$ 427.25	$ 435.69	$ 429.59	$ 431.65	$ 425.56	$ 433.49	$ 427.51
Auxiliary Energy Required Heating [GJ/yr]	197.1	192.5	197.5	192.9	197.9	193.4	197.1	192.5	197.4	192.8
Annual Energy DHW [GJ/yr]	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1	127.1
Annual Energy Space Heating [GJ/yr]	108.6	106.6	109.1	107	109.3	107.3	108.6	106.5	109.1	107
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	397.6	395.6	398	395.9	398.2	396.1	397.6	395.5	398	395.9
Design Heating Load [W]	40264.7	39600.2	40301.5	39637	40351.1	39686.5	40260.4	39595.9	40295.8	39631.3
Annual Energy Electricity [kWh/yr]	75149.6	74572.9	75241.3	74664.6	75304	74727.4	75144.2	74567.4	75234	74657.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 10,570.35	$ 10,488.75	$ 10,583.33	$ 10,501.73	$ 10,592.2	$ 10,510.61	$ 10,569.59	$ 10,487.97	$ 10,582.3	$ 10,500.69
Annual Energy Natural Gas [m3/yr]	3413.2	3413.2	3413.5	3413.5	3413.8	3413.8	3413.2	3413.2	3413.4	3413.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,472.34	$ 1,472.34	$ 1,472.46	$ 1,472.46	$ 1,472.59	$ 1,472.59	$ 1,472.34	$ 1,472.34	$ 1,472.42	$ 1,472.42
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	34636	34708	32692	32764	30748	30820	35284	35356	33340	33412
Upgrade Package List	Pkg3342031032	Pkg3342032032	Pkg3332031032	Pkg3332032032	Pkg3322031032	Pkg3322032032	Pkg3343031032	Pkg3343032032	Pkg3333031032	Pkg3333032032
GHGI [kg/m2]	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
% ICC	2.0%	2.1%	2.0%	2.1%	2.0%	2.1%	2.0%	2.1%	2.0%	2.1%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Target MEUI no cooling [kWh/(m2 * yr)]	55	55	55	55	55	55	55	55	55	55
Target MEUI cooling [kWh/(m2 * yr)]	60	60	60	60	60	60	60	60	60	60
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	33.1	32.3	33.2	32.4	33.2	32.5	33.1	32.3	33.1	32.4
Output: MEUI [kWh/(m2 * yr)]	40.8	40.4	40.8	40.5	40.9	40.5	40.8	40.4	40.8	40.5
Output: Better than ERS (%)	3860.0%	3890.0%	3860.0%	3890.0%	3850.0%	3890.0%	3860.0%	3900.0%	3860.0%	3890.0%
Output: Better than Envelope (%)	3560.0%	3710.0%	3540.0%	3690.0%	3530.0%	3680.0%	3560.0%	3710.0%	3550.0%	3700.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	135926	136503	135834	136411	135772	136348	135931	136508	135842	136418
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 19,165.55	$ 19,246.87	$ 19,152.62	$ 19,233.94	$ 19,143.78	$ 19,225.08	$ 19,166.31	$ 19,247.64	$ 19,153.65	$ 19,234.97
Annual savings in carbon tax for electricity [$/year]	$ 67.96	$ 68.25	$ 67.92	$ 68.21	$ 67.89	$ 68.17	$ 67.97	$ 68.25	$ 67.92	$ 68.21
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 19,233.51	$ 19,315.12	$ 19,220.54	$ 19,302.14	$ 19,211.67	$ 19,293.26	$ 19,234.28	$ 19,315.9	$ 19,221.57	$ 19,303.18
Annual savings in GHG from electricity savings [kg CO2e/year]	1495.2	1501.5	1494.2	1500.5	1493.5	1499.8	1495.2	1501.6	1494.3	1500.6
Annual savings in natural gas [m3/year]	25.24	25.24	25.25	25.25	25.26	25.26	25.24	25.24	25.25	25.25
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 233.84	$ 233.84	$ 233.94	$ 233.94	$ 234.05	$ 234.05	$ 233.84	$ 233.84	$ 233.91	$ 233.91
Annual savings in carbon tax for natural gas [$/year]	$ 58.37	$ 58.37	$ 58.39	$ 58.39	$ 58.42	$ 58.42	$ 58.37	$ 58.37	$ 58.38	$ 58.38
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 292.21	$ 292.21	$ 292.34	$ 292.34	$ 292.47	$ 292.47	$ 292.21	$ 292.21	$ 292.29	$ 292.29
Annual savings in GHG from natural gas savings [kg CO2e/year]	1297	1297	1297.6	1297.6	1298.2	1298.2	1297	1297	1297.4	1297.4
Net Present Value [$]	$ 258,886.03	$ 258,855.	$ 258,847.59	$ 258,816.56	$ 258,768.39	$ 258,736.99	$ 258,720.58	$ 258,689.73	$ 258,687.8	$ 258,656.77
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	11.19	9.02	11.19	9.02	11.19	9.02	11.19	9.02	11.19
Attic Ceiling Code	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60	CeilR50	CeilR60
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 3,614.63	$ 2,098.82	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 346.72	$ 346.72	$ 146.65	$ 146.65	$ 61.78	$ 61.78	$ 346.72	$ 346.72	$ 146.65	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR14	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 746.13	$ 746.13
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 16,629.07	$ 16,629.07	$ 16,629.07	$ 16,690.85	$ 16,690.85	$ 16,690.85	$ 16,690.85	$ 17,195.87	$ 17,195.87	$ 17,257.65
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 24,976.86	$ 24,976.86	$ 24,976.86	$ 25,069.66	$ 25,069.66	$ 25,069.66	$ 25,069.66	$ 25,828.2	$ 25,828.2	$ 25,920.99
Net Present Value [$]	$ 136,931.1	$ 136,931.1	$ 130,563.09	$ 136,875.9	$ 136,875.9	$ 130,507.33	$ 130,507.33	$ 137,587.55	$ 131,101.76	$ 137,535.99
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	541.2	541.2	550	541.2	541.2	550	550	539.6	548.4	539.6
Annual Energy DHW [GJ/yr]	129.5	129.5	129.5	129.5	129.5	129.5	129.5	129.5	129.5	129.5
Annual Energy Space Heating [GJ/yr]	539.3	539.3	548.2	539.3	539.3	548.2	548.2	537.6	546.7	537.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Total Energy [GJ/yr]	828.9	828.9	837.8	828.9	828.9	837.8	837.8	827.1	836.2	827.1
Design Heating Load [W]	65043.1	65043.1	66122.2	65042.3	65042.3	66121.3	66121.3	64935.7	66014.8	64934.6
Annual Energy Electricity [kWh/yr]	194263.4	194263.4	196737	194260.9	194260.9	196734.6	196734.6	193789.6	196309.2	193785.9
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 27,424.96	$ 27,424.96	$ 27,774.97	$ 27,424.6	$ 27,424.6	$ 27,774.63	$ 27,774.63	$ 27,357.91	$ 27,714.44	$ 27,357.39
Annual Energy Natural Gas [m3/yr]	3477.8	3477.8	3477.8	3477.8	3477.8	3477.8	3477.8	3477.4	3477.3	3477.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,500.2	$ 1,500.2	$ 1,500.2	$ 1,500.2	$ 1,500.2	$ 1,500.2	$ 1,500.2	$ 1,500.03	$ 1,499.99	$ 1,499.99
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39781	40141	39961	41941	42301	41761	42121	40501	40321	42661
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1101011011	Pkg1120021011	Pkg1121021011	Pkg1120011011	Pkg1121011011	Pkg1102021011	Pkg1102011011	Pkg1122021011
GHGI [kg/m2]	5.32	5.32	5.33	5.32	5.32	5.33	5.33	5.31	5.33	5.31
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	90.9	90.9	92.3	90.9	90.9	92.3	92.3	90.6	92.1	90.6
Output: MEUI [kWh/(m2 * yr)]	113.3	113.3	114.8	113.3	113.3	114.8	114.8	113.1	114.6	113.1
Output: Better than ERS (%)	970.0%	970.0%	1090.0%	970.0%	970.0%	1090.0%	1090.0%	940.0%	1070.0%	940.0%
Output: Better than Envelope (%)	4430.0%	4430.0%	4670.0%	4430.0%	4430.0%	4670.0%	4670.0%	4390.0%	4620.0%	4390.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	61888	61888	59414	61890	61890	59417	59417	62362	59842	62365
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 8,726.19	$ 8,726.19	$ 8,377.42	$ 8,726.55	$ 8,726.55	$ 8,377.75	$ 8,377.75	$ 8,793.	$ 8,437.74	$ 8,793.52
Annual savings in carbon tax for electricity [$/year]	$ 30.94	$ 30.94	$ 29.71	$ 30.95	$ 30.95	$ 29.71	$ 29.71	$ 31.18	$ 29.92	$ 31.18
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 8,757.14	$ 8,757.14	$ 8,407.12	$ 8,757.49	$ 8,757.49	$ 8,407.46	$ 8,407.46	$ 8,824.18	$ 8,467.66	$ 8,824.7
Annual savings in GHG from electricity savings [kg CO2e/year]	680.8	680.8	653.6	680.8	680.8	653.6	653.6	686	658.3	686
Annual savings in natural gas [m3/year]	25.65	25.65	25.65	25.65	25.65	25.65	25.65	25.64	25.63	25.63
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 237.67	$ 237.67	$ 237.67	$ 237.67	$ 237.67	$ 237.67	$ 237.67	$ 237.53	$ 237.5	$ 237.5
Annual savings in carbon tax for natural gas [$/year]	$ 59.32	$ 59.32	$ 59.32	$ 59.32	$ 59.32	$ 59.32	$ 59.32	$ 59.29	$ 59.28	$ 59.28
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 296.99	$ 296.99	$ 296.99	$ 296.99	$ 296.99	$ 296.99	$ 296.99	$ 296.82	$ 296.78	$ 296.78
Annual savings in GHG from natural gas savings [kg CO2e/year]	1318.3	1318.3	1318.3	1318.3	1318.3	1318.3	1318.3	1317.5	1317.3	1317.3
Net Present Value [$]	$ 136,931.1	$ 136,931.1	$ 130,563.09	$ 136,875.9	$ 136,875.9	$ 130,507.33	$ 130,507.33	$ 137,587.55	$ 131,101.76	$ 137,535.99
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$ 61.78	$ 61.78	$ 61.78	$ 61.78	$.	$.	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 566.8	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32	NA	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	4.67	5.64	5.64	4.67	4.67	5.64	4.67	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 2.5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 30,369.07	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,430.85	$ 30,430.85	$ 30,369.07	$ 30,369.07	$ 30,935.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 45,614.34	$ 45,614.34	$ 45,707.14	$ 45,707.14	$ 45,614.34	$ 45,707.14	$ 45,707.14	$ 45,614.34	$ 45,614.34	$ 46,465.68
Net Present Value [$]	$ 86,707.67	$ 86,707.67	$ 86,652.47	$ 86,652.47	$ 80,306.98	$ 80,251.95	$ 80,251.95	$ 73,233.63	$ 73,233.63	$ 87,509.9
Incremental dollars per GHG saving	$ 5.29	$ 5.29	$ 5.3	$ 5.3	$ 5.32	$ 5.33	$ 5.33	$ 5.34	$ 5.34	$ 5.38
Auxiliary Energy Required Heating [GJ/yr]	580	580	580	580	588.8	588.8	588.8	598.7	598.7	578
Annual Energy DHW [GJ/yr]	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5
Annual Energy Space Heating [GJ/yr]	577.5	577.5	577.5	577.5	586.5	586.5	586.5	596.4	596.4	575.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Total Energy [GJ/yr]	791.1	791.1	791.1	791.1	800.1	800	800	809.9	809.9	789.2
Design Heating Load [W]	64620.4	64620.4	64619.5	64619.5	65699.4	65698.5	65698.5	66131.3	66131.3	64512.9
Annual Energy Electricity [kWh/yr]	219750.2	219750.2	219747.6	219747.6	222236.4	222233.8	222233.8	224983.9	224983.9	219218.4
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 31,031.34	$ 31,031.34	$ 31,030.97	$ 31,030.97	$ 31,383.14	$ 31,382.77	$ 31,382.77	$ 31,771.91	$ 31,771.91	$ 30,956.09
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	39783	40143	41943	42303	39963	41763	42123	40863	41223	40503
Upgrade Package List	Pkg1100021011	Pkg1101021011	Pkg1120021011	Pkg1121021011	Pkg1101011011	Pkg1120011011	Pkg1121011011	Pkg1110021011	Pkg1111021011	Pkg1102021011
GHGI [kg/m2]	1.46	1.46	1.46	1.46	1.48	1.48	1.48	1.5	1.5	1.46
% ICC	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5
Output: TEDI [kWh/(m2 * yr)]	97.4	97.4	97.4	97.4	98.9	98.9	98.9	100.5	100.5	97
Output: MEUI [kWh/(m2 * yr)]	107	107	107	107	108.5	108.5	108.5	110.2	110.2	106.7
Output: Better than ERS (%)	810.0%	810.0%	810.0%	810.0%	930.0%	930.0%	930.0%	1070.0%	1070.0%	780.0%
Output: Better than Envelope (%)	5470.0%	5470.0%	5470.0%	5470.0%	5700.0%	5700.0%	5700.0%	5970.0%	5970.0%	5410.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	36401	36401	36404	36404	33915	33918	33918	31167	31167	36933
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 5,132.56	$ 5,132.56	$ 5,132.92	$ 5,132.92	$ 4,782.	$ 4,782.37	$ 4,782.37	$ 4,394.6	$ 4,394.6	$ 5,207.54
Annual savings in carbon tax for electricity [$/year]	$ 18.2	$ 18.2	$ 18.2	$ 18.2	$ 16.96	$ 16.96	$ 16.96	$ 15.58	$ 15.58	$ 18.47
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 5,150.76	$ 5,150.76	$ 5,151.12	$ 5,151.12	$ 4,798.96	$ 4,799.33	$ 4,799.33	$ 4,410.19	$ 4,410.19	$ 5,226.01
Annual savings in GHG from electricity savings [kg CO2e/year]	400.4	400.4	400.4	400.4	373.1	373.1	373.1	342.8	342.8	406.3
Annual savings in natural gas [m3/year]	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88
Annual savings in carbon tax for natural gas [$/year]	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7
Net Present Value [$]	$ 86,707.67	$ 86,707.67	$ 86,652.47	$ 86,652.47	$ 80,306.98	$ 80,251.95	$ 80,251.95	$ 73,233.63	$ 73,233.63	$ 87,509.9
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$ 61.78	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 77,638.02	$ 77,638.02	$ 77,699.8	$ 77,699.8	$ 78,204.82	$ 83,638.02	$ 83,638.02	$ 78,266.6	$ 84,204.82	$ 83,699.8
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 116,612.31	$ 116,612.31	$ 116,705.1	$ 116,705.1	$ 117,463.64	$ 125,624.31	$ 125,624.31	$ 117,556.43	$ 126,475.64	$ 125,717.1
Net Present Value [$]	$ 295,901.42	$ 295,901.42	$ 295,842.92	$ 295,842.92	$ 295,789.6	$ 295,746.86	$ 295,746.86	$ 295,732.57	$ 295,707.55	$ 295,688.73
Incremental dollars per GHG saving	$ 256.91	$ 256.91	$ 257.11	$ 257.11	$ 256.33	$ 51.65	$ 51.65	$ 256.53	$ 51.93	$ 51.69
Auxiliary Energy Required Heating [GJ/yr]	378.3	378.3	378.2	378.2	376.8	378.5	378.5	376.8	377	378.5
Annual Energy DHW [GJ/yr]	129.5	129.5	129.5	129.5	129.5	103.9	103.9	129.5	103.9	103.9
Annual Energy Space Heating [GJ/yr]	225.7	225.7	225.7	225.7	225.1	225.7	225.7	225.1	224.9	225.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	521.3	521.3	521.2	521.2	520.6	495.5	495.5	520.6	494.8	495.5
Design Heating Load [W]	61001.8	61001.8	61001	61001	60894.4	60511.3	60511.3	60893.3	60403.8	60510.4
Annual Energy Electricity [kWh/yr]	108815.9	108815.9	108814.6	108814.6	108640.9	108782.5	108782.5	108639	108577.6	108781.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 15,334.13	$ 15,334.13	$ 15,333.95	$ 15,333.95	$ 15,309.37	$ 15,329.41	$ 15,329.41	$ 15,309.1	$ 15,300.42	$ 15,329.21
Annual Energy Natural Gas [m3/yr]	3477.9	3477.9	3477.9	3477.9	3477.4	2790.3	2790.3	3477.4	2790.3	2790.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,500.24	$ 1,500.24	$ 1,500.24	$ 1,500.24	$ 1,500.03	$ 1,203.64	$ 1,203.64	$ 1,500.03	$ 1,203.64	$ 1,203.64
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	43156	43516	45316	45676	43876	43157	43517	46036	43877	45317
Upgrade Package List	Pkg1200022032	Pkg1201022032	Pkg1220022032	Pkg1221022032	Pkg1220022032	Pkg1200022032	Pkg1201022032	Pkg1220022032	Pkg1202022032	Pkg1220022032
GHGI [kg/m2]	4.75	4.75	4.75	4.75	4.75	3.95	3.95	4.75	3.95	3.95
% ICC	1.9%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	1.9%	2.0%	2.0%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65	100.65
Target MEUI no cooling [kWh/(m2 * yr)]	115	115	115	115	115	115	115	115	115	115
Target MEUI cooling [kWh/(m2 * yr)]	120	120	120	120	120	120	120	120	120	120
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5
Output: TEDI [kWh/(m2 * yr)]	63.5	63.5	63.5	63.5	63.3	63.5	63.5	63.3	63.3	63.5
Output: MEUI [kWh/(m2 * yr)]	61.4	61.4	61.4	61.4	61.3	57.1	57.1	61.3	57	57.1
Output: Better than ERS (%)	3240.0%	3240.0%	3240.0%	3240.0%	3250.0%	3480.0%	3480.0%	3250.0%	3490.0%	3480.0%
Output: Better than Envelope (%)	90.0%	90.0%	90.0%	90.0%	50.0%	90.0%	90.0%	50.0%	50.0%	90.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	147335	147335	147337	147337	147510	147369	147369	147512	147574	147370
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 20,774.29	$ 20,774.29	$ 20,774.47	$ 20,774.47	$ 20,798.97	$ 20,779.	$ 20,779.	$ 20,799.23	$ 20,807.89	$ 20,779.2
Annual savings in carbon tax for electricity [$/year]	$ 73.67	$ 73.67	$ 73.67	$ 73.67	$ 73.76	$ 73.68	$ 73.68	$ 73.76	$ 73.79	$ 73.69
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 20,847.96	$ 20,847.96	$ 20,848.14	$ 20,848.14	$ 20,872.72	$ 20,852.69	$ 20,852.69	$ 20,872.99	$ 20,881.68	$ 20,852.88
Annual savings in GHG from electricity savings [kg CO2e/year]	1620.7	1620.7	1620.7	1620.7	1622.6	1621.1	1621.1	1622.6	1623.3	1621.1
Annual savings in natural gas [m3/year]	25.66	25.66	25.66	25.66	25.64	0.04	0.04	25.64	0.04	0.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 237.71	$ 237.71	$ 237.71	$ 237.71	$ 237.53	$ .35	$ .35	$ 237.53	$ .35	$ .35
Annual savings in carbon tax for natural gas [$/year]	$ 59.33	$ 59.33	$ 59.33	$ 59.33	$ 59.29	$ .09	$ .09	$ 59.29	$ .09	$ .09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 297.04	$ 297.04	$ 297.04	$ 297.04	$ 296.82	$ .43	$ .43	$ 296.82	$ .43	$ .43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1318.5	1318.5	1318.5	1318.5	1317.5	1.9	1.9	1317.5	1.9	1.9
Net Present Value [$]	$ 295,901.42	$ 295,901.42	$ 295,842.92	$ 295,842.92	$ 295,789.6	$ 295,746.86	$ 295,746.86	$ 295,732.57	$ 295,707.55	$ 295,688.73
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$.	$ 61.78	$.	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$.	$.	$ 566.8	$ 566.8	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$ 6,000.	$.	$.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 33,522.21	$ 33,522.21	$ 33,583.99	$ 33,583.99	$ 34,089.01	$ 34,150.79	$ 34,514.61	$ 34,514.61	$ 34,514.61	$ 34,514.61
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,350.36	$ 50,350.36	$ 50,443.15	$ 50,443.15	$ 51,201.69	$ 51,294.49	$ 51,840.94	$ 51,840.94	$ 51,840.94	$ 51,840.94
Net Present Value [$]	$ 243,790.24	$ 243,790.24	$ 243,734.3	$ 243,734.3	$ 244,236.89	$ 244,183.88	$ 233,334.02	$ 233,334.02	$ 227,342.13	$ 227,342.13
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 30.21	$ 30.21	$ 30.9	$ 30.9
Auxiliary Energy Required Heating [GJ/yr]	367.8	367.8	367.8	367.8	366.3	366.3	389	389	397.3	397.3
Annual Energy DHW [GJ/yr]	129.5	129.5	129.5	129.5	129.5	129.5	103.9	103.9	103.9	103.9
Annual Energy Space Heating [GJ/yr]	366.3	366.3	366.3	366.3	364.9	364.8	387.6	387.6	395.9	395.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Total Energy [GJ/yr]	655.8	655.8	655.8	655.8	654.4	654.4	651.5	651.5	659.9	659.9
Design Heating Load [W]	47953.1	47953.1	47952.2	47952.2	47845.7	47844.6	49912.4	49912.4	50991.4	50991.4
Annual Energy Electricity [kWh/yr]	146194.3	146194.3	146192	146192	145802.2	145798.8	152106.8	152106.8	154434.3	154434.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 20,623.18	$ 20,623.18	$ 20,622.85	$ 20,622.85	$ 20,567.7	$ 20,567.22	$ 21,459.8	$ 21,459.8	$ 21,789.14	$ 21,789.14
Annual Energy Natural Gas [m3/yr]	3477.7	3477.7	3477.7	3477.7	3477.2	3477.2	2790.3	2790.3	2790.3	2790.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,500.16	$ 1,500.16	$ 1,500.16	$ 1,500.16	$ 1,499.94	$ 1,499.94	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	49537	49897	51697	52057	50257	52561	46298	46658	46118	46478
Upgrade Package List	Pkg2200021031	Pkg2201021031	Pkg2220021031	Pkg2221021031	Pkg2202021031	Pkg2222021031	Pkg2100021031	Pkg2101021031	Pkg2100011031	Pkg2101011031
GHGI [kg/m2]	5	5	5	5	4.99	4.99	4.24	4.24	4.26	4.26
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	61.7	61.7	61.7	61.7	61.5	61.5	65.3	65.3	66.7	66.7
Output: MEUI [kWh/(m2 * yr)]	84.3	84.3	84.3	84.3	84	84	83.6	83.6	85	85
Output: Better than ERS (%)	1320.0%	1320.0%	1320.0%	1320.0%	1340.0%	1340.0%	1260.0%	1260.0%	1140.0%	1140.0%
Output: Better than Envelope (%)	190.0%	190.0%	190.0%	190.0%	230.0%	230.0%	370.0%	370.0%	590.0%	590.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	109957	109957	109959	109959	110349	110352	104044	104044	101717	101717
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 15,503.94	$ 15,503.94	$ 15,504.26	$ 15,504.26	$ 15,559.22	$ 15,559.7	$ 14,670.27	$ 14,670.27	$ 14,342.1	$ 14,342.1
Annual savings in carbon tax for electricity [$/year]	$ 54.98	$ 54.98	$ 54.98	$ 54.98	$ 55.17	$ 55.18	$ 52.02	$ 52.02	$ 50.86	$ 50.86
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 15,558.92	$ 15,558.92	$ 15,559.24	$ 15,559.24	$ 15,614.4	$ 15,614.88	$ 14,722.3	$ 14,722.3	$ 14,392.96	$ 14,392.96
Annual savings in GHG from electricity savings [kg CO2e/year]	1209.5	1209.5	1209.6	1209.6	1213.8	1213.9	1144.5	1144.5	1118.9	1118.9
Annual savings in natural gas [m3/year]	25.65	25.65	25.65	25.65	25.63	25.63	0.04	0.04	0.04	0.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 237.64	$ 237.64	$ 237.64	$ 237.64	$ 237.47	$ 237.47	$ .35	$ .35	$ .35	$ .35
Annual savings in carbon tax for natural gas [$/year]	$ 59.31	$ 59.31	$ 59.31	$ 59.31	$ 59.27	$ 59.27	$ .09	$ .09	$ .09	$ .09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 296.95	$ 296.95	$ 296.95	$ 296.95	$ 296.74	$ 296.74	$ .43	$ .43	$ .43	$ .43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1318.1	1318.1	1318.1	1318.1	1317.1	1317.1	1.9	1.9	1.9	1.9
Net Present Value [$]	$ 243,790.24	$ 243,790.24	$ 243,734.3	$ 243,734.3	$ 244,236.89	$ 244,183.88	$ 233,334.02	$ 233,334.02	$ 227,342.13	$ 227,342.13
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 63,466.42	$ 63,466.42
Net Present Value [$]	$ 183,886.55	$ 183,886.55	$ 183,831.34	$ 183,831.34	$ 177,861.42	$ 177,861.42	$ 177,806.4	$ 177,806.4	$ 170,419.26	$ 170,419.26
Incremental dollars per GHG saving	$ 6.81	$ 6.81	$ 6.82	$ 6.82	$ 6.84	$ 6.84	$ 6.85	$ 6.85	$ 6.87	$ 6.87
Auxiliary Energy Required Heating [GJ/yr]	427	427	427	427	435.4	435.4	435.3	435.3	445.8	445.8
Annual Energy DHW [GJ/yr]	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5
Annual Energy Space Heating [GJ/yr]	425	425	425	425	433.4	433.4	433.4	433.4	443.9	443.9
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Total Energy [GJ/yr]	638.6	638.6	638.6	638.6	647	647	647	647	657.4	657.4
Design Heating Load [W]	49912.4	49912.4	49911.5	49911.5	50991.4	50991.4	50990.6	50990.6	51423.3	51423.3
Annual Energy Electricity [kWh/yr]	177386	177386	177383.4	177383.4	179726.3	179726.3	179723.7	179723.7	182617.1	182617.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 25,036.8	$ 25,036.8	$ 25,036.44	$ 25,036.44	$ 25,367.96	$ 25,367.96	$ 25,367.59	$ 25,367.59	$ 25,777.	$ 25,777.
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	46299	46659	48459	48819	46119	46479	48279	48639	47379	47739
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2120021031	Pkg2121021031	Pkg2100011031	Pkg2101011031	Pkg2120011031	Pkg2121011031	Pkg2110021031	Pkg2111021031
GHGI [kg/m2]	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	1.21	1.21
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	71.7	71.7	71.7	71.7	73.1	73.1	73.1	73.1	74.8	74.8
Output: MEUI [kWh/(m2 * yr)]	81.4	81.4	81.4	81.4	82.8	82.8	82.8	82.8	84.6	84.6
Output: Better than ERS (%)	1270.0%	1270.0%	1270.0%	1270.0%	1160.0%	1160.0%	1160.0%	1160.0%	1020.0%	1020.0%
Output: Better than Envelope (%)	1390.0%	1390.0%	1390.0%	1390.0%	1610.0%	1610.0%	1610.0%	1610.0%	1890.0%	1890.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	78765	78765	78768	78768	76425	76425	76428	76428	73534	73534
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 11,105.91	$ 11,105.91	$ 11,106.27	$ 11,106.27	$ 10,775.92	$ 10,775.92	$ 10,776.29	$ 10,776.29	$ 10,368.32	$ 10,368.32
Annual savings in carbon tax for electricity [$/year]	$ 39.38	$ 39.38	$ 39.38	$ 39.38	$ 38.21	$ 38.21	$ 38.21	$ 38.21	$ 36.77	$ 36.77
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 11,145.29	$ 11,145.29	$ 11,145.66	$ 11,145.66	$ 10,814.14	$ 10,814.14	$ 10,814.51	$ 10,814.51	$ 10,405.09	$ 10,405.09
Annual savings in GHG from electricity savings [kg CO2e/year]	866.4	866.4	866.4	866.4	840.7	840.7	840.7	840.7	808.9	808.9
Annual savings in natural gas [m3/year]	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88
Annual savings in carbon tax for natural gas [$/year]	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7
Net Present Value [$]	$ 183,886.55	$ 183,886.55	$ 183,831.34	$ 183,831.34	$ 177,861.42	$ 177,861.42	$ 177,806.4	$ 177,806.4	$ 170,419.26	$ 170,419.26
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step4 10 highest NPV

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 84,189.87	$ 84,389.94	$ 84,105.	$ 84,369.2	$ 84,569.27	$ 84,484.48	$ 84,684.55	$ 90,189.87	$ 84,284.33	$ 90,389.94
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 126,453.18	$ 126,753.69	$ 126,325.71	$ 126,722.54	$ 127,023.04	$ 126,895.69	$ 127,196.19	$ 135,465.18	$ 126,595.06	$ 135,765.69
Net Present Value [$]	$ 320,937.9	$ 320,909.7	$ 320,794.67	$ 320,784.5	$ 320,749.91	$ 320,707.62	$ 320,663.29	$ 320,661.71	$ 320,651.67	$ 320,633.09
Incremental dollars per GHG saving	$ 191.82	$ 191.8	$ 192.2	$ 192.19	$ 192.2	$ 192.27	$ 192.38	$ 51.43	$ 192.56	$ 51.53
Auxiliary Energy Required Heating [GJ/yr]	302.4	302	303	302.4	301.9	302.3	301.9	302.9	302.9	302.5
Annual Energy DHW [GJ/yr]	129.5	129.5	129.5	129.5	129.5	129.5	129.5	103.9	129.5	103.9
Annual Energy Space Heating [GJ/yr]	181.4	181.1	181.7	181.3	181.1	181.3	181	181.4	181.6	181.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	477.1	476.8	477.4	477	476.8	477	476.7	451.5	477.3	451.3
Design Heating Load [W]	47558.5	47518.7	47612.2	47552.4	47514.1	47543.7	47507.4	47119.8	47603.8	47080
Annual Energy Electricity [kWh/yr]	96548.9	96482.8	96636.8	96538.8	96475.2	96524.3	96464.1	96559.8	96622.7	96493.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,598.35	$ 13,589.	$ 13,610.79	$ 13,596.93	$ 13,587.93	$ 13,594.87	$ 13,586.36	$ 13,599.9	$ 13,608.8	$ 13,590.47
Annual Energy Natural Gas [m3/yr]	3477	3476.8	3477.2	3477	3476.8	3476.9	3476.8	2790.3	3477.2	2790.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,499.86	$ 1,499.77	$ 1,499.94	$ 1,499.86	$ 1,499.77	$ 1,499.81	$ 1,499.77	$ 1,203.64	$ 1,499.94	$ 1,203.64
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	60700	62644	58756	61348	63292	61996	63940	60701	59404	62645
Upgrade Package List	Pkg2332032032	Pkg2342032032	Pkg2322032032	Pkg2333032032	Pkg2343032032	Pkg2334032032	Pkg2344032032	Pkg2332032032	Pkg2323032032	Pkg2342032032
GHGI [kg/m2]	4.67	4.66	4.67	4.67	4.66	4.67	4.66	3.87	4.67	3.87
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.2%	2.0%	2.2%

Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65	75.65
Target MEUI no cooling [kWh/(m2 * yr)]	85	85	85	85	85	85	85	85	85	85
Target MEUI cooling [kWh/(m2 * yr)]	90	90	90	90	90	90	90	90	90	90
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%

Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	50.8	50.7	50.9	50.8	50.7	50.7	50.7	50.9	50.9	50.8
Output: MEUI [kWh/(m2 * yr)]	54	53.9	54	54	53.9	54	53.9	49.7	54	49.7
Output: Better than ERS (%)	3810.0%	3820.0%	3810.0%	3810.0%	3820.0%	3810.0%	3820.0%	4060.0%	3810.0%	4060.0%
Output: Better than Envelope (%)	1940.0%	1950.0%	1920.0%	1940.0%	1950.0%	1940.0%	1950.0%	1920.0%	1920.0%	1930.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	159602	159668	159514	159612	159676	159627	159687	159592	159529	159658
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 22,503.94	$ 22,513.26	$ 22,491.54	$ 22,505.36	$ 22,514.33	$ 22,507.41	$ 22,515.9	$ 22,502.4	$ 22,493.53	$ 22,511.79
Annual savings in carbon tax for electricity [$/year]	$ 79.8	$ 79.83	$ 79.76	$ 79.81	$ 79.84	$ 79.81	$ 79.84	$ 79.8	$ 79.76	$ 79.83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 22,583.74	$ 22,593.09	$ 22,571.3	$ 22,585.17	$ 22,594.17	$ 22,587.22	$ 22,595.74	$ 22,582.2	$ 22,573.3	$ 22,591.62
Annual savings in GHG from electricity savings [kg CO2e/year]	1755.6	1756.4	1754.7	1755.7	1756.4	1755.9	1756.6	1755.5	1754.8	1756.2
Annual savings in natural gas [m3/year]	25.62	25.62	25.63	25.62	25.62	25.62	25.62	0.04	25.63	0.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 237.4	$ 237.33	$ 237.47	$ 237.4	$ 237.33	$ 237.36	$ 237.33	$ .35	$ 237.47	$ .35
Annual savings in carbon tax for natural gas [$/year]	$ 59.25	$ 59.24	$ 59.27	$ 59.25	$ 59.24	$ 59.24	$ 59.24	$ .09	$ 59.27	$ .09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 296.65	$ 296.56	$ 296.74	$ 296.65	$ 296.56	$ 296.61	$ 296.56	$ .43	$ 296.74	$ .43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1316.7	1316.4	1317.1	1316.7	1316.4	1316.5	1316.4	1.9	1317.1	1.9
Net Present Value [$]	$ 320,937.9	$ 320,909.7	$ 320,794.67	$ 320,784.5	$ 320,749.91	$ 320,707.62	$ 320,663.29	$ 320,661.71	$ 320,651.67	$ 320,633.09

ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 146.65	$ 346.72	$ 146.65	$ 61.78	$ 346.72
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR10	BC EffR14	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 861.41	$ 861.41	$ 566.8	$ 746.13	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$ 6,000.	$.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step5 10 Lowest ICC

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 61,105.	$ 61,189.87	$ 61,284.33	$ 61,369.2	$ 61,389.94	$ 61,399.61	$ 61,484.48	$ 61,569.27	$ 61,684.55	$ 65,477.54
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 91,779.71	$ 91,907.18	$ 92,049.06	$ 92,176.54	$ 92,207.69	$ 92,222.21	$ 92,349.69	$ 92,477.04	$ 92,650.19	$ 98,347.27
Net Present Value [$]	$ 285,671.66	$ 286,094.19	$ 285,559.34	$ 285,963.8	$ 286,215.65	$ 285,616.05	$ 285,918.81	$ 286,074.48	$ 286,012.15	$ 284,964.15
Incremental dollars per GHG saving	$ 41.29	$ 41.29	$ 41.41	$ 41.4	$ 41.39	$ 41.46	$ 41.47	$ 41.5	$ 41.57	$ 43.78
Auxiliary Energy Required Heating [GJ/yr]	281.7	281.1	281.7	281.1	280.7	281.5	281	280.6	280.5	276.7
Annual Energy DHW [GJ/yr]	103.9	103.9	103.9	103.9	103.9	103.9	103.9	103.9	103.9	103.9
Annual Energy Space Heating [GJ/yr]	281.4	280.7	281.3	280.6	280.2	281	280.5	280.2	280.1	276.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	541.1	540.4	541	540.3	540	540.8	540.3	539.9	539.8	536
Design Heating Load [W]	40510.7	40456.9	40502.2	40450.8	40417.1	40490.3	40442.1	40412.5	40405.8	39904.2
Annual Energy Electricity [kWh/yr]	121448.6	121251.5	121422.6	121232.5	121126.6	121355.8	121205.2	121111.8	121091.2	120025
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 17,121.66	$ 17,093.77	$ 17,117.98	$ 17,091.08	$ 17,076.1	$ 17,108.53	$ 17,087.22	$ 17,074.	$ 17,071.09	$ 16,920.22
Annual Energy Natural Gas [m3/yr]	2790.3	2790.3	2790.3	2790.3	2790.3	2790.3	2790.3	2790.3	2790.3	2790.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64	$ 1,203.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	70418	72362	71066	73010	74306	71714	73658	74954	75602	70490
Upgrade Package List	Pkg3322032032	Pkg3332032032	Pkg3323032032	Pkg3333032032	Pkg3342032032	Pkg3324032032	Pkg3334032032	Pkg3343032032	Pkg3344032032	Pkg3322033032
GHGI [kg/m2]	4.04	4.04	4.04	4.03	4.03	4.04	4.03	4.03	4.03	4.03
% ICC	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	47.3	47.2	47.3	47.2	47.1	47.3	47.2	47.1	47.1	46.5
Output: MEUI [kWh/(m2 * yr)]	65	64.9	65	64.9	64.8	65	64.9	64.8	64.8	64.2
Output: Better than ERS (%)	2740.0%	2750.0%	2740.0%	2750.0%	2750.0%	2740.0%	2750.0%	2750.0%	2750.0%	2810.0%
Output: Better than Envelope (%)	2490.0%	2500.0%	2490.0%	2500.0%	2510.0%	2490.0%	2510.0%	2520.0%	2520.0%	2620.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	134703	134900	134729	134919	135025	134796	134946	135040	135060	136126
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 18,993.08	$ 19,020.87	$ 18,996.75	$ 19,023.55	$ 19,038.48	$ 19,006.17	$ 19,027.4	$ 19,040.57	$ 19,043.47	$ 19,193.81
Annual savings in carbon tax for electricity [$/year]	$ 67.35	$ 67.45	$ 67.36	$ 67.46	$ 67.51	$ 67.4	$ 67.47	$ 67.52	$ 67.53	$ 68.06
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 19,060.43	$ 19,088.32	$ 19,064.11	$ 19,091.01	$ 19,106.	$ 19,073.56	$ 19,094.87	$ 19,108.09	$ 19,111.	$ 19,261.87
Annual savings in GHG from electricity savings [kg CO2e/year]	1481.7	1483.9	1482	1484.1	1485.3	1482.8	1484.4	1485.4	1485.7	1497.4
Annual savings in natural gas [m3/year]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35	$ .35
Annual savings in carbon tax for natural gas [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43	$ .43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Net Present Value [$]	$ 285,671.66	$ 286,094.19	$ 285,559.34	$ 285,963.8	$ 286,215.65	$ 285,616.05	$ 285,918.81	$ 286,074.48	$ 286,012.15	$ 284,964.15
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	14.09
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR80
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 7,987.17
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step5 10 Lowest $/GHG Abatement Cost

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 65,591.47	$ 65,685.93	$ 65,791.54	$ 65,770.8	$ 65,801.21	$ 65,886.08	$ 65,970.87	$ 66,086.15	$ 67,329.19	$ 67,414.06
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 98,518.39	$ 98,660.27	$ 98,818.89	$ 98,787.74	$ 98,833.42	$ 98,960.89	$ 99,088.25	$ 99,261.4	$ 101,128.44	$ 101,255.92
Net Present Value [$]	$ 230,680.4	$ 230,113.05	$ 230,991.93	$ 230,565.71	$ 230,121.38	$ 230,542.63	$ 230,861.72	$ 230,817.47	$ 233,933.83	$ 234,408.58
Incremental dollars per GHG saving	$ 10.08	$ 10.1	$ 10.11	$ 10.11	$ 10.12	$ 10.13	$ 10.14	$ 10.15	$ 10.31	$ 10.32
Auxiliary Energy Required Heating [GJ/yr]	331.8	332.5	331.2	331.7	332.3	331.6	331.1	331	324.8	324
Annual Energy DHW [GJ/yr]	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5
Annual Energy Space Heating [GJ/yr]	331.1	331.8	330.4	331	331.6	330.9	330.4	330.3	324.2	323.4
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	540.5	542.2	539.8	540.4	541	540.3	539.7	539.6	533.5	532.8
Design Heating Load [W]	42032	42077.3	41992.2	42025.9	42065.4	42017.2	41987.6	41980.9	41221.8	41168.1
Annual Energy Electricity [kWh/yr]	150144.9	150328.6	149946.2	150119.8	150280.6	150084	149927.1	149899.5	148206.2	147988.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 21,182.19	$ 21,208.18	$ 21,154.07	$ 21,178.64	$ 21,201.39	$ 21,173.57	$ 21,151.37	$ 21,147.46	$ 20,907.86	$ 20,877.1
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	66531	65235	68475	67179	65883	67827	69123	69771	70347	72291
Upgrade Package List	Pkg3232032032	Pkg3223032032	Pkg3242032032	Pkg3233032032	Pkg3224032032	Pkg3234032032	Pkg3243032032	Pkg3244032032	Pkg3322031032	Pkg3332031032
GHGI [kg/m2]	1	1	1	1	1	1	1	1	0.99	0.98
% ICC	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	55.7	55.8	55.6	55.7	55.8	55.7	55.6	55.6	54.5	54.4
Output: MEUI [kWh/(m2 * yr)]	64.9	65	64.8	64.9	65	64.9	64.8	64.8	63.8	63.6
Output: Better than ERS (%)	2610.0%	2600.0%	2620.0%	2620.0%	2610.0%	2620.0%	2630.0%	2630.0%	2710.0%	2720.0%
Output: Better than Envelope (%)	1150.0%	1130.0%	1170.0%	1150.0%	1140.0%	1160.0%	1170.0%	1170.0%	1340.0%	1360.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	106006	105823	106205	106032	105871	106067	106224	106252	107945	108162
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 14,946.9	$ 14,921.	$ 14,974.92	$ 14,950.44	$ 14,927.77	$ 14,955.49	$ 14,977.61	$ 14,981.5	$ 15,220.26	$ 15,250.91
Annual savings in carbon tax for electricity [$/year]	$ 53.	$ 52.91	$ 53.1	$ 53.02	$ 52.94	$ 53.03	$ 53.11	$ 53.13	$ 53.97	$ 54.08
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 14,999.91	$ 14,973.91	$ 15,028.02	$ 15,003.46	$ 14,980.7	$ 15,008.52	$ 15,030.72	$ 15,034.63	$ 15,274.23	$ 15,304.99
Annual savings in GHG from electricity savings [kg CO2e/year]	1166.1	1164	1168.3	1166.3	1164.6	1166.7	1168.5	1168.8	1187.4	1189.8
Annual savings in natural gas [m3/year]	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93	103.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88	$ 962.88
Annual savings in carbon tax for natural gas [$/year]	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33	$ 240.33
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21	$ 1,203.21
Annual savings in GHG from natural gas savings [kg CO2e/year]	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7	5340.7
Net Present Value [$]	$ 230,680.4	$ 230,113.05	$ 230,991.93	$ 230,565.71	$ 230,121.38	$ 230,542.63	$ 230,861.72	$ 230,817.47	$ 233,933.83	$ 234,408.58

ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	9.02	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 61.78	$ 346.72	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Fort Nelson: Step5 10 highest NPV

Summary Data	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON	FORTNELSON
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95
Total increase in construction cost [$]	$ 86,689.87	$ 86,889.94	$ 86,605.	$ 86,869.2	$ 87,069.27	$ 86,984.48	$ 87,184.55	$ 86,784.33	$ 86,899.61	$ 92,689.87
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 130,208.18	$ 130,508.69	$ 130,080.71	$ 130,477.54	$ 130,778.04	$ 130,650.69	$ 130,951.19	$ 130,350.06	$ 130,523.21	$ 139,220.18
Net Present Value [$]	$ 328,077.35	$ 328,044.4	$ 327,935.76	$ 327,923.77	$ 327,884.43	$ 327,844.82	$ 327,797.27	$ 327,791.67	$ 327,726.05	$ 327,655.03
Incremental dollars per GHG saving	$ 180.49	$ 180.53	$ 180.84	$ 180.83	$ 180.87	$ 180.99	$ 181.07	$ 181.14	$ 181.31	$ 51.66
Auxiliary Energy Required Heating [GJ/yr]	280.2	279.8	280.8	280.2	279.7	280.1	279.7	280.7	280.6	281.2
Annual Energy DHW [GJ/yr]	129.5	129.5	129.5	129.5	129.5	129.5	129.5	129.5	129.5	103.9
Annual Energy Space Heating [GJ/yr]	167.9	167.6	168.2	167.8	167.6	167.8	167.6	168.1	168.1	168.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	463.6	463.3	463.9	463.5	463.3	463.5	463.3	463.9	463.8	438.3
Design Heating Load [W]	42725.9	42686.1	42779.6	42719.8	42681.5	42711.1	42674.8	42771.2	42759.3	42353
Annual Energy Electricity [kWh/yr]	92805	92740.7	92892.3	92795	92733.2	92780.9	92722.3	92878.6	92859.3	92872.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 13,068.59	$ 13,059.49	$ 13,080.95	$ 13,067.18	$ 13,058.43	$ 13,065.18	$ 13,056.89	$ 13,079.01	$ 13,076.28	$ 13,078.12
Annual Energy Natural Gas [m3/yr]	3476.9	3476.7	3477.1	3476.9	3476.7	3476.9	3476.7	3477.1	3477.1	2790.3
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,499.81	$ 1,499.73	$ 1,499.9	$ 1,499.81	$ 1,499.73	$ 1,499.81	$ 1,499.73	$ 1,499.9	$ 1,499.9	$ 1,203.64
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	72364	74308	70420	73012	74956	73660	75604	71068	71716	72365
Upgrade Package List	Pkg3332032032	Pkg3342032032	Pkg3322032032	Pkg3333032032	Pkg3343032032	Pkg3334032032	Pkg3344032032	Pkg3323032032	Pkg3324032032	Pkg3332032032
GHGI [kg/m2]	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	3.85
% ICC	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.2%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
Target MEUI no cooling [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI cooling [kWh/(m2 * yr)]	70	70	70	70	70	70	70	70	70	70
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	47	47	47.1	47	47	47	47	47.1	47.1	47.2
Output: MEUI [kWh/(m2 * yr)]	51.7	51.7	51.8	51.7	51.7	51.7	51.7	51.8	51.8	47.5
Output: Better than ERS (%)	3990.0%	3990.0%	3980.0%	3990.0%	3990.0%	3990.0%	3990.0%	3980.0%	3980.0%	4230.0%
Output: Better than Envelope (%)	2530.0%	2540.0%	2510.0%	2530.0%	2540.0%	2530.0%	2540.0%	2510.0%	2520.0%	2500.0%

Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	163346	163411	163259	163356	163418	163370	163429	163273	163292	163279
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 23,031.83	$ 23,040.89	$ 23,019.52	$ 23,033.24	$ 23,041.95	$ 23,035.23	$ 23,043.49	$ 23,021.45	$ 23,024.17	$ 23,022.34
Annual savings in carbon tax for electricity [$/year]	$ 81.67	$ 81.71	$ 81.63	$ 81.68	$ 81.71	$ 81.69	$ 81.71	$ 81.64	$ 81.65	$ 81.64
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 23,113.5	$ 23,122.6	$ 23,101.15	$ 23,114.92	$ 23,123.66	$ 23,116.91	$ 23,125.2	$ 23,103.09	$ 23,105.82	$ 23,103.98
Annual savings in GHG from electricity savings [kg CO2e/year]	1796.8	1797.5	1795.8	1796.9	1797.6	1797.1	1797.7	1796	1796.2	1796.1
Annual savings in natural gas [m3/year]	25.62	25.61	25.63	25.62	25.61	25.62	25.61	25.63	25.63	0.04
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 237.36	$ 237.29	$ 237.43	$ 237.36	$ 237.29	$ 237.36	$ 237.29	$ 237.43	$ 237.43	$ .35
Annual savings in carbon tax for natural gas [$/year]	$ 59.24	$ 59.23	$ 59.26	$ 59.24	$ 59.23	$ 59.24	$ 59.23	$ 59.26	$ 59.26	$ .09
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 296.61	$ 296.52	$ 296.69	$ 296.61	$ 296.52	$ 296.61	$ 296.52	$ 296.69	$ 296.69	$ .43
Annual savings in GHG from natural gas savings [kg CO2e/year]	1316.5	1316.2	1316.9	1316.5	1316.2	1316.5	1316.2	1316.9	1316.9	1.9
Net Present Value [$]	$ 328,077.35	$ 328,044.4	$ 327,935.76	$ 327,923.77	$ 327,884.43	$ 327,844.82	$ 327,797.27	$ 327,791.67	$ 327,726.05	$ 327,655.03

ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 146.65	$ 346.72	$ 61.78	$ 61.78	$ 146.65
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]	NBC 936 2.84 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	BCGasTankless0.95
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$ 6,000.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step3 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 2 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 18,144.88	$ 18,144.88	$ 18,206.66	$ 18,206.66	$ 18,711.68	$ 18,773.46	$ 19,129.07	$ 19,129.07	$ 19,129.07	$ 19,129.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 27,253.61	$ 27,253.61	$ 27,346.4	$ 27,346.4	$ 28,104.94	$ 28,197.74	$ 28,731.86	$ 28,731.86	$ 28,731.86	$ 28,731.86
Net Present Value [$]	$ 161,658.16	$ 161,658.16	$ 161,603.14	$ 161,603.14	$ 162,474.19	$ 162,422.45	$ 207,809.02	$ 207,809.02	$ 200,692.95	$ 200,692.95
Incremental dollars per GHG saving	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.	$ 999,999.
Auxiliary Energy Required Heating [GJ/yr]	637.9	637.9	637.9	637.9	636.3	636.2	571.7	571.7	581.5	581.5
Annual Energy DHW [GJ/yr]	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5
Annual Energy Space Heating [GJ/yr]	634.6	634.6	634.6	634.6	632.7	632.7	568.7	568.7	578.7	578.7
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total Energy [GJ/yr]	926.2	926.2	926.2	926.2	924.3	924.3	860.3	860.3	870.3	870.3
Design Heating Load [W]	68545	68545	68544.1	68544.1	68439.5	68438.3	59181.7	59181.7	60313.8	60313.8
Annual Energy Electricity [kWh/yr]	220762.5	220762.5	220759.9	220759.9	220226.7	220222.8	202454	202454	205218.1	205218.1
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 31,174.58	$ 31,174.58	$ 31,174.21	$ 31,174.21	$ 31,098.76	$ 31,098.21	$ 28,583.93	$ 28,583.93	$ 28,975.05	$ 28,975.05
Annual Energy Natural Gas [m3/yr]	3530.5	3530.5	3530.5	3530.5	3530.1	3530.1	3530.4	3530.4	3530.4	3530.4
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,522.93	$ 1,522.93	$ 1,522.93	$ 1,522.93	$ 1,522.76	$ 1,522.76	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	79471	79831	81631	81991	80191	82351	85861	86221	85681	86041
Upgrade Package List	Pkg1100022011	Pkg1101022011	Pkg1120022011	Pkg1121022011	Pkg1102022011	Pkg1122022011	Pkg2100021011	Pkg2101021011	Pkg2100011011	Pkg2101011011
GHGI [kg/m2]	5.55	5.55	5.55	5.55	5.55	5.55	5.43	5.43	5.45	5.45
% ICC	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 2 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	107.1	107.1	107.1	107.1	106.8	106.8	96	96	97.6	97.6
Output: MEUI [kWh/(m2 * yr)]	129.7	129.7	129.7	129.7	129.4	129.4	118.6	118.6	120.3	120.3
Output: Better than ERS (%)	830.0%	830.0%	830.0%	830.0%	810.0%	810.0%	60.0%	60.0%	170.0%	170.0%
Output: Better than Envelope (%)	4150.0%	4150.0%	4150.0%	4150.0%	4120.0%	4120.0%	2680.0%	2680.0%	2900.0%	2900.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	72109	72109	72111	72111	72645	72648	90417	90417	87653	87653
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 10,167.34	$ 10,167.34	$ 10,167.71	$ 10,167.71	$ 10,242.89	$ 10,243.44	$ 12,748.84	$ 12,748.84	$ 12,359.1	$ 12,359.1
Annual savings in carbon tax for electricity [$/year]	$ 36.05	$ 36.05	$ 36.06	$ 36.06	$ 36.32	$ 36.32	$ 45.21	$ 45.21	$ 43.83	$ 43.83
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 10,203.4	$ 10,203.4	$ 10,203.76	$ 10,203.76	$ 10,279.21	$ 10,279.76	$ 12,794.05	$ 12,794.05	$ 12,402.93	$ 12,402.93
Annual savings in GHG from electricity savings [kg CO2e/year]	793.2	793.2	793.2	793.2	799.1	799.1	994.6	994.6	964.2	964.2
Annual savings in natural gas [m3/year]	25.97	25.97	25.97	25.97	25.95	25.95	25.96	25.96	25.96	25.96
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 240.57	$ 240.57	$ 240.57	$ 240.57	$ 240.43	$ 240.43	$ 240.54	$ 240.54	$ 240.54	$ 240.54
Annual savings in carbon tax for natural gas [$/year]	$ 60.05	$ 60.05	$ 60.05	$ 60.05	$ 60.01	$ 60.01	$ 60.04	$ 60.04	$ 60.04	$ 60.04
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 300.62	$ 300.62	$ 300.62	$ 300.62	$ 300.45	$ 300.45	$ 300.58	$ 300.58	$ 300.58	$ 300.58
Annual savings in GHG from natural gas savings [kg CO2e/year]	1334.4	1334.4	1334.4	1334.4	1333.6	1333.6	1334.2	1334.2	1334.2	1334.2
Net Present Value [$]	$ 161,658.16	$ 161,658.16	$ 161,603.14	$ 161,603.14	$ 162,474.19	$ 162,422.45	$ 207,809.02	$ 207,809.02	$ 200,692.95	$ 200,692.95
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	4.67	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step3 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 32,869.07	$ 32,869.07	$ 32,930.85	$ 32,930.85	$ 32,869.07	$ 32,869.07	$ 32,930.85	$ 32,930.85	$ 32,869.07	$ 32,869.07
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 49,369.34	$ 49,369.34	$ 49,462.14	$ 49,462.14	$ 49,369.34	$ 49,369.34	$ 49,462.14	$ 49,462.14	$ 49,369.34	$ 49,369.34
Net Present Value [$]	$ 156,942.23	$ 156,942.23	$ 156,887.57	$ 156,887.57	$ 149,796.76	$ 149,796.76	$ 149,741.92	$ 149,741.92	$ 142,234.82	$ 142,234.82
Incremental dollars per GHG saving	$ 5.36	$ 5.36	$ 5.37	$ 5.37	$ 5.38	$ 5.38	$ 5.39	$ 5.39	$ 5.41	$ 5.41
Auxiliary Energy Required Heating [GJ/yr]	611.9	611.9	611.9	611.9	621.8	621.8	621.7	621.7	632.4	632.4
Annual Energy DHW [GJ/yr]	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4
Annual Energy Space Heating [GJ/yr]	607.6	607.6	607.6	607.6	617.6	617.6	617.6	617.6	628.2	628.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total Energy [GJ/yr]	822.1	822.1	822.1	822.1	832.1	832.1	832.1	832.1	842.7	842.7
Design Heating Load [W]	58810	58810	58809.1	58809.1	59942.1	59942.1	59941.2	59941.2	60360.1	60360.1
Annual Energy Electricity [kWh/yr]	228361.8	228361.8	228359	228359	231137.3	231137.3	231134.6	231134.6	234074.6	234074.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 32,249.88	$ 32,249.88	$ 32,249.48	$ 32,249.48	$ 32,642.61	$ 32,642.61	$ 32,642.23	$ 32,642.23	$ 33,058.24	$ 33,058.24
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	85863	86223	88023	88383	85683	86043	87843	88203	86943	87303
Upgrade Package List	Pkg2100021011	Pkg2101021011	Pkg2120021011	Pkg2121021011	Pkg2100011011	Pkg2101011011	Pkg2120011011	Pkg2121011011	Pkg2110021011	Pkg2111021011
GHGI [kg/m2]	1.52	1.52	1.52	1.52	1.54	1.54	1.54	1.54	1.56	1.56
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	102.7	102.7	102.7	102.7	104.4	104.4	104.4	104.4	106.2	106.2
Output: MEUI [kWh/(m2 * yr)]	112.2	112.2	112.2	112.2	113.9	113.9	113.9	113.9	115.7	115.7
Output: Better than ERS (%)	100.0%	100.0%	100.0%	100.0%	20.0%	20.0%	20.0%	20.0%	150.0%	150.0%
Output: Better than Envelope (%)	3580.0%	3580.0%	3580.0%	3580.0%	3800.0%	3800.0%	3790.0%	3790.0%	4030.0%	4030.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	64510	64510	64512	64512	61734	61734	61737	61737	58797	58797
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 9,095.84	$ 9,095.84	$ 9,096.23	$ 9,096.23	$ 8,704.49	$ 8,704.49	$ 8,704.87	$ 8,704.87	$ 8,290.33	$ 8,290.33
Annual savings in carbon tax for electricity [$/year]	$ 32.25	$ 32.25	$ 32.26	$ 32.26	$ 30.87	$ 30.87	$ 30.87	$ 30.87	$ 29.4	$ 29.4
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 9,128.09	$ 9,128.09	$ 9,128.49	$ 9,128.49	$ 8,735.36	$ 8,735.36	$ 8,735.74	$ 8,735.74	$ 8,319.73	$ 8,319.73
Annual savings in GHG from electricity savings [kg CO2e/year]	709.6	709.6	709.6	709.6	679.1	679.1	679.1	679.1	646.8	646.8
Annual savings in natural gas [m3/year]	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17
Annual savings in carbon tax for natural gas [$/year]	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5
Net Present Value [$]	$ 156,942.23	$ 156,942.23	$ 156,887.57	$ 156,887.57	$ 149,796.76	$ 149,796.76	$ 149,741.92	$ 149,741.92	$ 142,234.82	$ 142,234.82
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Window Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step3 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 2.5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 84,204.82	$ 84,266.6	$ 83,638.02	$ 83,638.02	$ 83,699.8	$ 83,699.8	$ 78,204.82	$ 78,266.6	$ 77,638.02	$ 77,638.02
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 126,475.64	$ 126,568.43	$ 125,624.31	$ 125,624.31	$ 125,717.1	$ 125,717.1	$ 117,463.64	$ 117,556.43	$ 116,612.31	$ 116,612.31
Net Present Value [$]	$ 325,810.16	$ 325,754.22	$ 325,737.18	$ 325,737.18	$ 325,679.78	$ 325,679.78	$ 325,531.11	$ 325,475.17	$ 325,466.24	$ 325,466.24
Incremental dollars per GHG saving	$ 48.12	$ 48.16	$ 47.87	$ 47.87	$ 47.91	$ 47.91	$ 187.9	$ 188.05	$ 188.08	$ 188.08
Auxiliary Energy Required Heating [GJ/yr]	464.6	464.6	466.2	466.2	466.2	466.2	464.9	464.9	466.5	466.5
Annual Energy DHW [GJ/yr]	105.6	105.6	105.6	105.6	105.6	105.6	131.5	131.5	131.5	131.5
Annual Energy Space Heating [GJ/yr]	318.9	318.9	319.8	319.8	319.8	319.8	319.4	319.4	320.3	320.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	586.5	586.5	587.4	587.4	587.4	587.4	613.1	613.1	614	614
Design Heating Load [W]	64570.6	64569.5	64676.1	64676.1	64675.2	64675.2	65110.5	65109.3	65216	65216
Annual Energy Electricity [kWh/yr]	133604.5	133602.2	133853	133853	133851.3	133851.3	133780.6	133778.3	134024.6	134024.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 18,841.72	$ 18,841.4	$ 18,876.88	$ 18,876.88	$ 18,876.64	$ 18,876.64	$ 18,866.64	$ 18,866.31	$ 18,901.17	$ 18,901.17
Annual Energy Natural Gas [m3/yr]	2834.7	2834.7	2834.7	2834.7	2834.7	2834.7	3530.2	3530.2	3530.6	3530.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,522.81	$ 1,522.81	$ 1,522.98	$ 1,522.98
Step Code Level	3	3	3	3	3	3	3	3	3	3
HTAP Run Number	83477	85637	82757	83117	84917	85277	83476	85636	82756	83116
Upgrade Package List	Pkg1202022032	Pkg1222022032	Pkg1200222032	Pkg1201022032	Pkg1220022032	Pkg1221022032	Pkg1202022032	Pkg1222022032	Pkg1200022032	Pkg1201022032
GHGI [kg/m2]	4.17	4.17	4.17	4.17	4.17	4.17	4.97	4.97	4.98	4.98
% ICC	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.9%
Step Code Target Values										
Target ACH@50Pa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Target TEDI [kWh/(m2 * yr)]	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5
Target MEUI no cooling [kWh/(m2 * yr)]	130	130	130	130	130	130	130	130	130	130
Target MEUI cooling [kWh/(m2 * yr)]	135	135	135	135	135	135	135	135	135	135
Target Output: Better than ERS (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Target Output: Better than Envelope (%)	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%	1000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5	ACH 2.5
Output: TEDI [kWh/(m2 * yr)]	78	78	78.3	78.3	78.3	78.3	78	78	78.3	78.3
Output: MEUI [kWh/(m2 * yr)]	72.5	72.5	72.6	72.6	72.6	72.6	76.9	76.9	77.1	77.1
Output: Better than ERS (%)	3160.0%	3160.0%	3150.0%	3150.0%	3150.0%	3150.0%	2940.0%	2940.0%	2930.0%	2930.0%
Output: Better than Envelope (%)	310.0%	310.0%	340.0%	340.0%	340.0%	340.0%	320.0%	320.0%	350.0%	350.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	159267	159269	159018	159018	159020	159020	159091	159093	158847	158847
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 22,456.62	$ 22,456.94	$ 22,421.58	$ 22,421.58	$ 22,421.82	$ 22,421.82	$ 22,431.79	$ 22,432.11	$ 22,397.38	$ 22,397.38
Annual savings in carbon tax for electricity [$/year]	$ 79.63	$ 79.63	$ 79.51	$ 79.51	$ 79.51	$ 79.51	$ 79.55	$ 79.55	$ 79.42	$ 79.42
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 22,536.25	$ 22,536.58	$ 22,501.09	$ 22,501.09	$ 22,501.33	$ 22,501.33	$ 22,511.33	$ 22,511.66	$ 22,476.81	$ 22,476.81
Annual savings in GHG from electricity savings [kg CO2e/year]	1751.9	1752	1749.2	1749.2	1749.2	1749.2	1750	1750	1747.3	1747.3
Annual savings in natural gas [m3/year]	0.04	0.04	0.04	0.04	0.04	0.04	25.95	25.95	25.97	25.97
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ 240.47	$ 240.47	$ 240.61	$ 240.61
Annual savings in carbon tax for natural gas [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ 60.02	$ 60.02	$ 60.05	$ 60.05
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ 300.49	$ 300.49	$ 300.66	$ 300.66
Annual savings in GHG from natural gas savings [kg CO2e/year]	2.1	2.1	2.1	2.1	2.1	2.1	1333.8	1333.8	1334.5	1334.5
Net Present Value [$]	$ 325,810.16	$ 325,754.22	$ 325,737.18	$ 325,737.18	$ 325,679.78	$ 325,679.78	$ 325,531.11	$ 325,475.17	$ 325,466.24	$ 325,466.24
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02	NBC FlatCeiling_[RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78	$.	$.
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10	NBC 936 uninsulated EffR0	NA
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$.	$.	$.	$.	$ 566.8	$ 566.8	$.	$.
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step4 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 30 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt AtticCeilings=>CeilR50
Total increase in construction cost [$]	$ 33,522.21	$ 33,522.21	$ 33,522.21	$ 33,522.21	$ 33,583.99	$ 33,583.99	$ 33,583.99	$ 33,583.99	$ 34,089.01	$ 34,089.01
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 50,350.36	$ 50,350.36	$ 50,350.36	$ 50,350.36	$ 50,443.15	$ 50,443.15	$ 50,443.15	$ 50,443.15	$ 51,201.69	$ 51,201.69
Net Present Value [$]	$ 282,169.72	$ 282,169.72	$ 275,373.9	$ 275,373.9	$ 282,114.69	$ 282,114.69	$ 275,318.88	$ 275,318.88	$ 282,677.54	$ 275,891.22
Incremental dollars per GHG saving	$ 846.52	$ 846.52	$ 3,162.47	$ 3,162.47	$ 848.08	$ 848.08	$ 3,168.3	$ 3,168.3	$ 754.18	$ 2,104.26
Auxiliary Energy Required Heating [GJ/yr]	447.4	447.4	456.8	456.8	447.4	447.4	456.7	456.7	445.8	455.2
Annual Energy DHW [GJ/yr]	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5	131.5
Annual Energy Space Heating [GJ/yr]	444.6	444.6	454.1	454.1	444.6	444.6	454.1	454.1	443.1	452.6
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total Energy [GJ/yr]	736.2	736.2	745.7	745.7	736.2	736.2	745.7	745.7	734.7	744.2
Design Heating Load [W]	50798.6	50798.6	51930.7	51930.7	50797.7	50797.7	51929.8	51929.8	50693.1	51825.2
Annual Energy Electricity [kWh/yr]	167979.1	167979.1	170618.8	170618.8	167976.5	167976.5	170616.2	170616.2	167563.3	170199.3
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 23,705.73	$ 23,705.73	$ 24,079.25	$ 24,079.25	$ 23,705.36	$ 23,705.36	$ 24,078.88	$ 24,078.88	$ 23,646.89	$ 24,019.89
Annual Energy Natural Gas [m3/yr]	3530.4	3530.4	3530.4	3530.4	3530.4	3530.4	3530.4	3530.4	3529.9	3529.9
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.89	$ 1,522.68	$ 1,522.68
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	89137	89497	88957	89317	91297	91657	91117	91477	89857	89677
Upgrade Package List	Pkg2200021031	Pkg2201021031	Pkg2200011031	Pkg2201011031	Pkg2220021031	Pkg2221021031	Pkg2220011031	Pkg2221011031	Pkg2202021031	Pkg2202011031
GHGI [kg/m2]	5.2	5.2	5.22	5.22	5.2	5.2	5.22	5.22	5.2	5.22
% ICC	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	75.1	75.1	76.7	76.7	75.1	75.1	76.7	76.7	74.8	76.4
Output: MEUI [kWh/(m2 * yr)]	97.8	97.8	99.4	99.4	97.8	97.8	99.4	99.4	97.5	99.1
Output: Better than ERS (%)	1390.0%	1390.0%	1280.0%	1280.0%	1390.0%	1390.0%	1280.0%	1280.0%	1410.0%	1300.0%
Output: Better than Envelope (%)	70.0%	70.0%	140.0%	140.0%	70.0%	70.0%	130.0%	130.0%	110.0%	100.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	124892	124892	122252	122252	124895	124895	122255	122255	125308	122672
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 17,609.8	$ 17,609.8	$ 17,237.6	$ 17,237.6	$ 17,610.17	$ 17,610.17	$ 17,237.97	$ 17,237.97	$ 17,668.43	$ 17,296.75
Annual savings in carbon tax for electricity [$/year]	$ 62.45	$ 62.45	$ 61.13	$ 61.13	$ 62.45	$ 62.45	$ 61.13	$ 61.13	$ 62.65	$ 61.34
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 17,672.25	$ 17,672.25	$ 17,298.73	$ 17,298.73	$ 17,672.61	$ 17,672.61	$ 17,299.1	$ 17,299.1	$ 17,731.08	$ 17,358.09
Annual savings in GHG from electricity savings [kg CO2e/year]	1373.8	1373.8	1344.8	1344.8	1373.8	1373.8	1344.8	1344.8	1378.4	1349.4
Annual savings in natural gas [m3/year]	25.96	25.96	25.96	25.96	25.96	25.96	25.96	25.96	25.94	25.94
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 240.54	$ 240.54	$ 240.54	$ 240.54	$ 240.54	$ 240.54	$ 240.54	$ 240.54	$ 240.37	$ 240.37
Annual savings in carbon tax for natural gas [$/year]	$ 60.04	$ 60.04	$ 60.04	$ 60.04	$ 60.04	$ 60.04	$ 60.04	$ 60.04	$ 59.99	$ 59.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 300.58	$ 300.58	$ 300.58	$ 300.58	$ 300.58	$ 300.58	$ 300.58	$ 300.58	$ 300.36	$ 300.36
Annual savings in GHG from natural gas savings [kg CO2e/year]	1334.2	1334.2	1334.2	1334.2	1334.2	1334.2	1334.2	1334.2	1333.2	1333.2
Net Present Value [$]	$ 282,169.72	$ 282,169.72	$ 275,373.9	$ 275,373.9	$ 282,114.69	$ 282,114.69	$ 275,318.88	$ 275,318.88	$ 282,677.54	$ 275,891.22
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff	BC R 30 eff
Above Grade Wall RSI	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28
Above Grade Wall Cost of Upgrade	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85	$ 15,787.85
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$.	$.	$ 61.78	$ 61.78	$ 61.78	$ 61.78	$.	$.
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32	BC ExpFloor R32	NA	NA	BC ExpFloor R32	NA
Exposed Floor RSI	5.64	5.64	4.67	4.67	5.64	5.64	4.67	4.67	5.64	4.67
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step4 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 5 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 22 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R32 Opt AtticCeilings=>CeilR50 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,254.61	$ 42,254.61	$ 42,316.39	$ 42,316.39	$ 42,821.41	$ 42,883.19
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 63,466.42	$ 63,466.42	$ 63,559.22	$ 63,559.22	$ 64,317.76	$ 64,410.55
Net Present Value [$]	$ 219,493.54	$ 219,493.54	$ 219,438.88	$ 219,438.88	$ 212,650.07	$ 212,650.07	$ 212,595.23	$ 212,595.23	$ 220,373.54	$ 220,323.81
Incremental dollars per GHG saving	$ 6.56	$ 6.56	$ 6.57	$ 6.57	$ 6.59	$ 6.59	$ 6.6	$ 6.6	$ 6.64	$ 6.65
Auxiliary Energy Required Heating [GJ/yr]	510.8	510.8	510.8	510.8	520.2	520.2	520.2	520.2	508.7	508.7
Annual Energy DHW [GJ/yr]	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4
Annual Energy Space Heating [GJ/yr]	507	507	507	507	516.6	516.6	516.6	516.6	505	505
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total Energy [GJ/yr]	721.5	721.5	721.5	721.5	731.1	731.1	731.1	731.1	719.5	719.5
Design Heating Load [W]	52830.6	52830.6	52829.8	52829.8	53962.8	53962.8	53961.9	53961.9	52725.1	52724
Annual Energy Electricity [kWh/yr]	200419.2	200419.2	200416.4	200416.4	203077.4	203077.4	203074.7	203074.7	199857.2	199852.5
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 28,296.	$ 28,296.	$ 28,295.61	$ 28,295.61	$ 28,672.14	$ 28,672.14	$ 28,671.76	$ 28,671.76	$ 28,216.48	$ 28,215.81
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	85899	86259	88059	88419	85719	86079	87879	88239	86619	88779
Upgrade Package List	Pkg2100021031	Pkg2101021031	Pkg2120021031	Pkg2121021031	Pkg2100011031	Pkg2101011031	Pkg2120011031	Pkg2121011031	Pkg2102021031	Pkg2122021031
GHGI [kg/m2]	1.33	1.33	1.33	1.33	1.35	1.35	1.35	1.35	1.33	1.33
% ICC	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5	ACH 1 5
Output: TEDI [kWh/(m2 * yr)]	85.8	85.8	85.8	85.8	87.3	87.3	87.3	87.3	85.4	85.4
Output: MEUI [kWh/(m2 * yr)]	95.3	95.3	95.3	95.3	96.9	96.9	96.9	96.9	95	95
Output: Better than ERS (%)	1310.0%	1310.0%	1310.0%	1310.0%	1200.0%	1200.0%	1200.0%	1200.0%	1340.0%	1340.0%
Output: Better than Envelope (%)	1330.0%	1330.0%	1330.0%	1330.0%	1540.0%	1540.0%	1540.0%	1540.0%	1290.0%	1290.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	92452	92452	92455	92455	89794	89794	89797	89797	93014	93019
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 13,035.75	$ 13,035.75	$ 13,036.14	$ 13,036.14	$ 12,660.94	$ 12,660.94	$ 12,661.32	$ 12,661.32	$ 13,114.99	$ 13,115.65
Annual savings in carbon tax for electricity [$/year]	$ 46.23	$ 46.23	$ 46.23	$ 46.23	$ 44.9	$ 44.9	$ 44.9	$ 44.9	$ 46.51	$ 46.51
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 13,081.97	$ 13,081.97	$ 13,082.37	$ 13,082.37	$ 12,705.84	$ 12,705.84	$ 12,706.22	$ 12,706.22	$ 13,161.5	$ 13,162.16
Annual savings in GHG from electricity savings [kg CO2e/year]	1017	1017	1017	1017	987.7	987.7	987.8	987.8	1023.2	1023.2
Annual savings in natural gas [m3/year]	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17
Annual savings in carbon tax for natural gas [$/year]	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5
Net Present Value [$]	$ 219,493.54	$ 219,493.54	$ 219,438.88	$ 219,438.88	$ 212,650.07	$ 212,650.07	$ 212,595.23	$ 212,595.23	$ 220,373.54	$ 220,323.81
ECM Details Envelope Components										
Attic Ceiling RSI	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
Attic Ceiling Code	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50	CeilR50
Attic Ceiling Cost of Upgrade	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff	BC R 22 eff
Above Grade Wall RSI	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Above Grade Wall Cost of Upgrade	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25	$ 10,780.25
Foundation Wall Interior Insulation Cost of Upgrade	$.	$.	$ 61.78	$ 61.78	$.	$.	$ 61.78	$ 61.78	$.	$ 61.78
Foundation Slab Below Grade Code	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	NBC 936 uninsulated EffR0	NA	BC EffR10	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$ 566.8	$ 566.8
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	BC ExpFloor R32	NA	NA	NA	NA	BC ExpFloor R32	BC ExpFloor R32
Exposed Floor RSI	5.64	5.64	5.64	5.64	4.67	4.67	4.67	4.67	5.64	5.64
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step4 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR20 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1.5 Opt Windows=>USI1.40 SHGC0.35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 90,389.94	$ 90,189.87	$ 84,389.94	$ 90,569.27	$ 90,369.2	$ 84,189.87	$ 90,105.	$ 90,484.48	$ 90,684.55	$ 84,569.27
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 135,765.69	$ 135,465.18	$ 126,753.69	$ 136,035.04	$ 135,734.54	$ 126,453.18	$ 135,337.71	$ 135,907.69	$ 136,208.19	$ 127,023.04
Net Present Value [$]	$ 364,569.98	$ 364,558.98	$ 364,421.64	$ 364,415.3	$ 364,412.15	$ 364,411.69	$ 364,371.8	$ 364,342.7	$ 364,336.17	$ 364,266.78
Incremental dollars per GHG saving	$ 46.55	$ 46.47	$ 138.34	$ 46.64	$ 46.56	$ 138.31	$ 46.45	$ 46.61	$ 46.69	$ 138.62
Auxiliary Energy Required Heating [GJ/yr]	372.2	372.7	372.2	372.2	372.7	372.7	373.4	372.6	372.1	372.1
Annual Energy DHW [GJ/yr]	105.6	105.6	131.4	105.6	105.6	131.4	105.6	105.6	105.6	131.4
Annual Energy Space Heating [GJ/yr]	255.9	256.2	256.4	255.9	256.2	256.7	256.6	256.1	255.8	256.3
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	523.7	524	550	523.7	523.9	550.3	524.4	523.9	523.6	550
Design Heating Load [W]	50025	50066	50511.1	50020.2	50059.7	50552.1	50121.3	50050.7	50013.3	50506.3
Annual Energy Electricity [kWh/yr]	116146.4	116228.4	116273.7	116136.8	116215.8	116354.6	116334.1	116198	116122.8	116264.2
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 16,371.4	$ 16,383.	$ 16,389.41	$ 16,370.04	$ 16,381.22	$ 16,400.86	$ 16,397.96	$ 16,378.7	$ 16,368.06	$ 16,388.07
Annual Energy Natural Gas [m3/yr]	2834.7	2834.7	3529.6	2834.7	2834.7	3529.8	2834.7	2834.7	2834.7	3529.6
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,222.79	$ 1,222.79	$ 1,522.55	$ 1,222.79	$ 1,222.79	$ 1,522.63	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,522.55
Step Code Level	4	4	4	4	4	4	4	4	4	4
HTAP Run Number	102245	100301	102244	102893	100949	100300	98357	101597	103541	102892
Upgrade Package List	Pkg2342032032	Pkg2332032032	Pkg2342032032	Pkg2343032032	Pkg2333032032	Pkg2332032032	Pkg2322032032	Pkg2334032032	Pkg2344032032	Pkg2343032032
GHGI [kg/m2]	4.05	4.05	4.86	4.05	4.05	4.86	4.05	4.05	4.05	4.86
% ICC	2.2%	2.2%	2.0%	2.2%	2.2%	2.0%	2.2%	2.2%	2.2%	2.0%
Step Code Target Values										
Target ACH@50Pa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Target TEDI [kWh/(m2 * yr)]	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Target MEUI no cooling [kWh/(m2 * yr)]	100	100	100	100	100	100	100	100	100	100
Target MEUI cooling [kWh/(m2 * yr)]	105	105	105	105	105	105	105	105	105	105
Target Output: Better than ERS (%)	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%	4000.0%
Target Output: Better than Envelope (%)	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%	2000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5	ACH 1.5
Output: TEDI [kWh/(m2 * yr)]	62.5	62.6	62.5	62.5	62.6	62.6	62.7	62.5	62.5	62.5
Output: MEUI [kWh/(m2 * yr)]	61.9	62	66.4	61.9	62	66.4	62	62	61.9	66.3
Output: Better than ERS (%)	3890.0%	3880.0%	3670.0%	3890.0%	3890.0%	3660.0%	3880.0%	3890.0%	3890.0%	3670.0%
Output: Better than Envelope (%)	1740.0%	1730.0%	1740.0%	1740.0%	1730.0%	1730.0%	1720.0%	1730.0%	1740.0%	1740.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	176725	176643	176598	176734	176656	176517	176537	176673	176748	176607
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 24,918.21	$ 24,906.65	$ 24,900.26	$ 24,919.56	$ 24,908.43	$ 24,888.85	$ 24,891.75	$ 24,910.94	$ 24,921.54	$ 24,901.6
Annual savings in carbon tax for electricity [$/year]	$ 88.36	$ 88.32	$ 88.3	$ 88.37	$ 88.33	$ 88.26	$ 88.27	$ 88.34	$ 88.37	$ 88.3
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 25,006.57	$ 24,994.97	$ 24,988.56	$ 25,007.93	$ 24,996.75	$ 24,977.11	$ 24,980.01	$ 24,999.27	$ 25,009.91	$ 24,989.9
Annual savings in GHG from electricity savings [kg CO2e/year]	1944	1943.1	1942.6	1944.1	1943.2	1941.7	1941.9	1943.4	1944.2	1942.7
Annual savings in natural gas [m3/year]	0.04	0.04	25.93	0.04	0.04	25.94	0.04	0.04	0.04	25.93
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .38	$ .38	$ 240.26	$ .38	$ .38	$ 240.33	$ .38	$ .38	$ .38	$ 240.26
Annual savings in carbon tax for natural gas [$/year]	$ .09	$ .09	$ 59.97	$ .09	$ .09	$ 59.99	$ .09	$ .09	$ .09	$ 59.97
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .47	$ .47	$ 300.23	$ .47	$ .47	$ 300.32	$ .47	$ .47	$ .47	$ 300.23
Annual savings in GHG from natural gas savings [kg CO2e/year]	2.1	2.1	1332.6	2.1	2.1	1333	2.1	2.1	2.1	1332.6
Net Present Value [$]	$ 364,569.98	$ 364,558.98	$ 364,421.64	$ 364,415.3	$ 364,412.15	$ 364,411.69	$ 364,371.8	$ 364,342.7	$ 364,336.17	$ 364,266.78
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35	USI1.40 SHGC0.35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 346.72	$ 146.65	$ 346.72	$ 346.72	$ 146.65	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 346.72
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR20	BC EffR20	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 566.8	$ 861.41	$ 861.41	$ 746.13
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$.	$ 6,000.	$ 6,000.	$.	$ 6,000.	$ 6,000.	$ 6,000.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step5 10 Lowest ICC

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR80 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>BCGasTankless0.95	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 65,477.54	$ 65,562.41	$ 65,656.87	$ 65,741.74	$ 65,762.48	$ 65,772.15	$ 65,857.02	$ 65,941.81	$ 66,057.09	$ 68,845.
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 98,347.27	$ 98,474.74	$ 98,616.62	$ 98,744.09	$ 98,775.24	$ 98,789.77	$ 98,917.24	$ 99,044.6	$ 99,217.75	$ 103,405.19
Net Present Value [$]	$ 334,611.93	$ 335,002.33	$ 334,508.01	$ 334,877.78	$ 335,291.41	$ 334,497.53	$ 334,840.28	$ 335,154.25	$ 335,097.58	$ 284,655.39
Incremental dollars per GHG saving	$ 38.35	$ 38.35	$ 38.45	$ 38.45	$ 38.42	$ 38.5	$ 38.51	$ 38.52	$ 38.59	$ 10.07
Auxiliary Energy Required Heating [GJ/yr]	339.9	339.2	339.8	339.1	338.7	339.6	339	338.6	338.5	384.4
Annual Energy DHW [GJ/yr]	105.6	105.6	105.6	105.6	105.6	105.6	105.6	105.6	105.6	54.4
Annual Energy Space Heating [GJ/yr]	339	338.3	338.9	338.3	337.7	338.8	338.2	337.6	337.5	383
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	600.4	599.8	600.3	599.7	599.1	600.2	599.6	599	598.9	593.2
Design Heating Load [W]	42092.8	42037.5	42084.2	42031.2	41996.5	42071.9	42022.2	41991.7	41984.9	42729.1
Annual Energy Electricity [kWh/yr]	137459.9	137275.3	137430.6	137254	137085.3	137389.9	137223.8	137068.9	137046.1	164779.6
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 19,387.26	$ 19,361.14	$ 19,383.11	$ 19,358.13	$ 19,334.25	$ 19,377.36	$ 19,353.85	$ 19,331.93	$ 19,328.71	$ 23,253.
Annual Energy Natural Gas [m3/yr]	2834.7	2834.7	2834.7	2834.7	2834.7	2834.7	2834.7	2834.7	2834.7	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$ 1,222.79	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	110090	112034	110738	112682	113978	111386	113330	114626	115274	110019
Upgrade Package List	Pkg3322033032	Pkg3332033032	Pkg3323033032	Pkg3333033032	Pkg3342033032	Pkg3324033032	Pkg3334033032	Pkg3343033032	Pkg3344033032	Pkg3322032032
GHGI [kg/m2]	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19	1.1
% ICC	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	57.1	56.9	57	56.9	56.9	57	56.9	56.8	56.8	64.5
Output: MEUI [kWh/(m2 * yr)]	75	74.9	75	74.9	74.8	74.9	74.8	74.8	74.7	73.8
Output: Better than ERS (%)	2880.0%	2890.0%	2890.0%	2890.0%	2900.0%	2890.0%	2890.0%	2900.0%	2900.0%	2860.0%
Output: Better than Envelope (%)	2460.0%	2470.0%	2460.0%	2480.0%	2490.0%	2470.0%	2480.0%	2490.0%	2490.0%	1470.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	155411	155596	155441	155617	155786	155481	155648	155802	155825	128092
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 21,913.01	$ 21,939.04	$ 21,917.14	$ 21,942.04	$ 21,965.83	$ 21,922.88	$ 21,946.3	$ 21,968.14	$ 21,971.35	$ 18,060.93
Annual savings in carbon tax for electricity [$/year]	$ 77.71	$ 77.8	$ 77.72	$ 77.81	$ 77.89	$ 77.74	$ 77.82	$ 77.9	$ 77.91	$ 64.05
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 21,990.71	$ 22,016.83	$ 21,994.86	$ 22,019.85	$ 22,043.72	$ 22,000.62	$ 22,024.12	$ 22,046.04	$ 22,049.27	$ 18,124.98
Annual savings in GHG from electricity savings [kg CO2e/year]	1709.5	1711.6	1709.8	1711.8	1713.6	1710.3	1712.1	1713.8	1714.1	1409
Annual savings in natural gas [m3/year]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	105.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ .38	$ 978.17
Annual savings in carbon tax for natural gas [$/year]	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ .09	$ 244.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ .47	$ 1,222.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	5425.5
Net Present Value [$]	$ 334,611.93	$ 335,002.33	$ 334,508.01	$ 334,877.78	$ 335,291.41	$ 334,497.53	$ 334,840.28	$ 335,154.25	$ 335,097.58	$ 284,655.39
ECM Details Envelope Components										
Attic Ceiling RSI	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	14.09	11.19
Attic Ceiling Code	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR80	CeilR60
Attic Ceiling Cost of Upgrade	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 7,987.17	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR10
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 566.8
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60
DHW System Code	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	BCGasTankless0.95	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.
DHW System Cost of Upgrade	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 6,000.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step5 10 Lowest $/GHG Abatement Cost

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt DHWSystem=>elec heatpump ef1.90	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR50 Opt VentSystem=>HRV sre 75 Opt DHWSystem=>elec heatpump ef1.90
Total increase in construction cost [$]	$ 68,845.	$ 68,929.87	$ 69,024.33	$ 69,129.94	$ 69,109.2	$ 69,139.61	$ 69,224.48	$ 69,309.27	$ 69,424.55	$ 72,308.74
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 103,405.19	$ 103,532.66	$ 103,674.54	$ 103,833.17	$ 103,802.02	$ 103,847.69	$ 103,975.17	$ 104,102.52	$ 104,275.67	$ 108,607.73
Net Present Value [$]	$ 284,655.39	$ 285,167.03	$ 284,568.82	$ 285,417.21	$ 285,056.35	$ 284,585.	$ 285,039.48	$ 285,290.65	$ 285,251.51	$ 278,969.59
Incremental dollars per GHG saving	$ 10.07	$ 10.08	$ 10.1	$ 10.11	$ 10.11	$ 10.12	$ 10.12	$ 10.13	$ 10.15	$ 10.6
Auxiliary Energy Required Heating [GJ/yr]	384.4	383.6	384.3	382.9	383.5	384.1	383.3	382.9	382.7	387.4
Annual Energy DHW [GJ/yr]	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4
Annual Energy Space Heating [GJ/yr]	383	382.1	382.8	381.5	382	382.7	381.9	381.4	381.3	386.1
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	593.2	592.4	593.1	591.7	592.2	592.9	592.1	591.7	591.6	596.3
Design Heating Load [W]	42729.1	42673.8	42720.4	42632.8	42667.5	42708.2	42658.5	42628	42621.1	43173.8
Annual Energy Electricity [kWh/yr]	164779.6	164547.9	164743.6	164373	164521.2	164692.5	164483	164352.5	164322.9	165642.7
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 23,253.	$ 23,220.21	$ 23,247.9	$ 23,195.46	$ 23,216.43	$ 23,240.67	$ 23,211.03	$ 23,192.56	$ 23,188.38	$ 23,375.13
Annual Energy Natural Gas [m3/yr]	0	0	0	0	0	0	0	0	0	0
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	110019	111963	110667	113907	112611	111315	113259	114555	115203	115137
Upgrade Package List	Pkg3322032032	Pkg3332032032	Pkg3323032032	Pkg3342032032	Pkg3333032032	Pkg3324032032	Pkg3334032032	Pkg3343032032	Pkg3344032032	Pkg3344031033
GHGI [kg/m2]	1.1	1.09	1.1	1.09	1.09	1.09	1.09	1.09	1.09	1.1
% ICC	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0	ACH 1 0
Output: TEDI [kWh/(m2 * yr)]	64.5	64.4	64.5	64.3	64.4	64.5	64.4	64.3	64.3	65
Output: MEUI [kWh/(m2 * yr)]	73.8	73.6	73.8	73.5	73.6	73.7	73.6	73.5	73.5	74.3
Output: Better than ERS (%)	2860.0%	2870.0%	2860.0%	2880.0%	2870.0%	2860.0%	2870.0%	2880.0%	2880.0%	2820.0%
Output: Better than Envelope (%)	1470.0%	1490.0%	1470.0%	1500.0%	1490.0%	1480.0%	1500.0%	1500.0%	1510.0%	1400.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	128092	128323	128128	128498	128350	128179	128388	128519	128548	127229
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 18,060.93	$ 18,093.6	$ 18,066.01	$ 18,118.26	$ 18,097.36	$ 18,073.21	$ 18,102.75	$ 18,121.15	$ 18,125.32	$ 17,939.23
Annual savings in carbon tax for electricity [$/year]	$ 64.05	$ 64.16	$ 64.06	$ 64.25	$ 64.18	$ 64.09	$ 64.19	$ 64.26	$ 64.27	$ 63.61
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 18,124.98	$ 18,157.76	$ 18,130.07	$ 18,182.51	$ 18,161.54	$ 18,137.3	$ 18,166.94	$ 18,185.41	$ 18,189.6	$ 18,002.85
Annual savings in GHG from electricity savings [kg CO2e/year]	1409	1411.6	1409.4	1413.5	1411.9	1410	1412.3	1413.7	1414	1399.5
Annual savings in natural gas [m3/year]	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58	105.58
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17	$ 978.17
Annual savings in carbon tax for natural gas [$/year]	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15	$ 244.15
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32	$ 1,222.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5	5425.5
Net Present Value [$]	$ 284,655.39	$ 285,167.03	$ 284,568.82	$ 285,417.21	$ 285,056.35	$ 284,585.	$ 285,039.48	$ 285,290.65	$ 285,251.51	$ 278,969.59
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	9.02
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR50
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 2,098.82
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 61.78	$ 146.65	$ 61.78	$ 346.72	$ 146.65	$ 61.78	$ 146.65	$ 346.72	$ 346.72	$ 346.72
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR10	BC EffR14	BC EffR20	BC EffR20	BC EffR14	BC EffR20	BC EffR20
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 566.8	$ 746.13	$ 861.41	$ 861.41	$ 746.13	$ 861.41	$ 861.41
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat	NBC elec heat
Ventilation System Code	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 60	HRV sre 75
DHW System Code	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90	elec heatpump ef1.90
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Ventilation System Cost of Upgrade	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 13,600.	$ 18,000.
DHW System Cost of Upgrade	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.	$ 13,740.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

MURB Uranium City: Step5 10 highest NPV

	result 1	result 2	result 3	result 4	result 5	result 6	result 7	result 8	result 9	result 10
Summary Data										
Archetype	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k	murb.h2k
Weather Location	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY	URANIUMCITY
Upgrades from Base Case File	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 1 0 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR21 Opt FoundationSlabBelowGrade=>BC EffR10 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 60 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR25 Opt FoundationSlabBelowGrade=>BC EffR20 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP	ACH@50Pa=>ACH 0 6 Opt Windows=>USI1 40 SHGC0 35 Opt AboveGradeWall=>BC R 40 eff Opt FoundationWallIntIns=>BC EffR17 Opt FoundationSlabBelowGrade=>BC EffR14 Opt ExposedFloor=>BC ExpFloor R36 Opt AtticCeilings=>CeilR60 Opt VentSystem=>HRV sre 75 Opt Heating Cooling=>BC CCASHP
Total increase in construction cost [$]	$ 96,289.94	$ 96,089.87	$ 96,469.27	$ 96,269.2	$ 96,005.	$ 86,889.94	$ 96,384.48	$ 86,689.87	$ 96,584.55	$ 96,184.33
ICC with multiplier (Van=1.0,this Cz =1.502)	$ 144,627.49	$ 144,326.98	$ 144,896.84	$ 144,596.34	$ 144,199.51	$ 130,508.69	$ 144,769.49	$ 130,208.18	$ 145,069.99	$ 144,468.86
Net Present Value [$]	$ 376,700.28	$ 376,688.68	$ 376,545.41	$ 376,542.45	$ 376,490.67	$ 376,478.6	$ 376,473.18	$ 376,470.83	$ 376,428.55	$ 376,356.68
Incremental dollars per GHG saving	$ 134.95	$ 134.92	$ 135.19	$ 135.12	$ 135.1	$ 129.22	$ 135.24	$ 129.18	$ 135.31	$ 135.28
Auxiliary Energy Required Heating [GJ/yr]	324.7	325.1	324.6	325.1	325.8	343.6	325	344.1	324.5	325.7
Annual Energy DHW [GJ/yr]	131.4	131.4	131.4	131.4	131.5	131.4	131.4	131.4	131.4	131.5
Annual Energy Space Heating [GJ/yr]	222.6	222.9	222.5	222.8	223.2	236	222.7	236.3	222.5	223.2
Annual Energy Plug Loads [GJ/yr]	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7	153.7
Annual Energy Ventilation [GJ/yr]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Energy [GJ/yr]	516.2	516.5	516.2	516.5	516.9	529.7	516.4	530	516.2	516.9
Design Heating Load [W]	41506.4	41547.4	41501.6	41541.1	41602.7	45155.4	41532.1	45196.5	41494.8	41594.1
Annual Energy Electricity [kWh/yr]	106882.2	106963.8	106872.7	106951.3	107073	110619.6	106933.4	110699.7	106873.7	107055.8
Annual Electricity cost (includes carbon tax but not sales tax) [$/yr]	$ 15,060.52	$ 15,072.06	$ 15,059.17	$ 15,070.29	$ 15,087.51	$ 15,589.36	$ 15,067.76	$ 15,600.69	$ 15,059.31	$ 15,085.08
Annual Energy Natural Gas [m3/yr]	3529.5	3529.7	3529.5	3529.6	3529.9	3529.5	3529.6	3529.7	3529.4	3529.8
Annual Natural Gas cost (includes carbon tax but not sales tax) [$/yr]	$ 1,522.5	$ 1,522.59	$ 1,522.5	$ 1,522.55	$ 1,522.68	$ 1,522.5	$ 1,522.55	$ 1,522.59	$ 1,522.46	$ 1,522.63
Step Code Level	5	5	5	5	5	5	5	5	5	5
HTAP Run Number	118324	117748	118516	117940	117172	113908	118132	111964	118708	117364
Upgrade Package List	Pkg4342032033	Pkg4332032033	Pkg4343032033	Pkg4333032033	Pkg4322032033	Pkg3342032032	Pkg4334032033	Pkg3332032032	Pkg4344032033	Pkg4323032033
GHGI [kg/m2]	4.79	4.8	4.79	4.8	4.8	4.82	4.8	4.82	4.79	4.8
% ICC	2.3%	2.3%	2.3%	2.3%	2.3%	2.1%	2.3%	2.1%	2.3%	2.3%
Step Code Target Values										
Target ACH@50Pa	1	1	1	1	1	1	1	1	1	1
Target TEDI [kWh/(m2 * yr)]	65	65	65	65	65	65	65	65	65	65
Target MEUI no cooling [kWh/(m2 * yr)]	75	75	75	75	75	75	75	75	75	75
Target MEUI cooling [kWh/(m2 * yr)]	80	80	80	80	80	80	80	80	80	80
Target Output: Better than ERS (%)										
Target Output: Better than Envelope (%)	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%	5000.0%
Step Code Numbers per ECM Package										
Choosen ACH@50Pa	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 0 6	ACH 1 0	ACH 0 6	ACH 1 0	ACH 0 6	ACH 0 6
Output: TEDI [kWh/(m2 * yr)]	54.5	54.6	54.5	54.6	54.7	57.7	54.6	57.8	54.5	54.7
Output: MEUI [kWh/(m2 * yr)]	60.7	60.7	60.7	60.7	60.8	62.9	60.7	63	60.7	60.8
Output: Better than ERS (%)	4060.0%	4050.0%	4060.0%	4050.0%	4050.0%	3900.0%	4050.0%	3900.0%	4060.0%	4050.0%
Output: Better than Envelope (%)	2800.0%	2790.0%	2800.0%	2790.0%	2770.0%	2380.0%	2790.0%	2370.0%	2800.0%	2770.0%
Savings per ECM Package: Fuel quantity, fuel costs and GHG emission:										
Annual savings in electricity [kWh/yr]	185989	185908	185999	185920	185798	182252	185938	182172	185998	185816
Annual savings in cost of electricity (excluding carbon tax) [$/year]	$ 26,224.46	$ 26,212.96	$ 26,225.8	$ 26,214.72	$ 26,197.56	$ 25,697.49	$ 26,217.24	$ 25,686.2	$ 26,225.66	$ 26,199.99
Annual savings in carbon tax for electricity [$/year]	$ 92.99	$ 92.95	$ 93.	$ 92.96	$ 92.9	$ 91.13	$ 92.97	$ 91.09	$ 93.	$ 92.91
Total Annual savings in cost of electricity (including carbon tax but not including sales tax) [$/year]	$ 26,317.46	$ 26,305.91	$ 26,318.8	$ 26,307.68	$ 26,290.46	$ 25,788.62	$ 26,310.21	$ 25,777.28	$ 26,318.66	$ 26,292.89
Annual savings in GHG from electricity savings [kg CO2e/year]	2045.9	2045	2046	2045.1	2043.8	2004.8	2045.3	2003.9	2046	2044
Annual savings in natural gas [m3/year]	25.93	25.94	25.93	25.93	25.94	25.93	25.93	25.94	25.92	25.94
Annual savings in cost of natural gas (excluding carbon tax) [$/year]	$ 240.23	$ 240.3	$ 240.23	$ 240.26	$ 240.37	$ 240.23	$ 240.26	$ 240.3	$ 240.19	$ 240.33
Annual savings in carbon tax for natural gas [$/year]	$ 59.96	$ 59.98	$ 59.96	$ 59.97	$ 59.99	$ 59.96	$ 59.97	$ 59.98	$ 59.95	$ 59.99
Total Annual savings in cost of natural gas (including carbon tax but not including sales tax) [$/year]	$ 300.19	$ 300.27	$ 300.19	$ 300.23	$ 300.36	$ 300.19	$ 300.23	$ 300.27	$ 300.14	$ 300.32
Annual savings in GHG from natural gas savings [kg CO2e/year]	1332.4	1332.8	1332.4	1332.6	1333.2	1332.4	1332.6	1332.8	1332.2	1333
Net Present Value [$]	$ 376,700.28	$ 376,688.68	$ 376,545.41	$ 376,542.45	$ 376,490.67	$ 376,478.6	$ 376,473.18	$ 376,470.83	$ 376,428.55	$ 376,356.68
ECM Details Envelope Components										
Attic Ceiling RSI	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
Attic Ceiling Code	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60	CeilR60
Attic Ceiling Cost of Upgrade	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63	$ 3,614.63
Flat Ceiling Code	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02	NBC FlatCeiling [RSI]5.02
Flat Ceiling Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Window Code	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35	USI1 40 SHGC0 35
Window Cost of Upgrade	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54	$ 9,385.54
Above Grade Wall Code	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff	BC R 40 eff
Above Grade Wall RSI	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04	7.04
Above Grade Wall Cost of Upgrade	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25	$ 19,126.25
Foundation Wall Interior Insulation Cost of Upgrade	$ 346.72	$ 146.65	$ 346.72	$ 146.65	$ 61.78	$ 346.72	$ 146.65	$ 146.65	$ 346.72	$ 61.78
Foundation Slab Below Grade Code	BC EffR10	BC EffR10	BC EffR14	BC EffR14	BC EffR10	BC EffR10	BC EffR20	BC EffR10	BC EffR20	BC EffR14
Foundation Slab Below Grade Code Cost of Upgrade	$ 566.8	$ 566.8	$ 746.13	$ 746.13	$ 566.8	$ 566.8	$ 861.41	$ 566.8	$ 861.41	$ 746.13
Foundation Slab on Grade	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]	NBC 936 3.72 [RSI]
Foundation Slab on Grade Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Exposed Floor Code	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36	BC ExpFloor R36
Exposed Floor RSI	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34
Exposed Floor Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
ECM Details Mechanical Components										
Heating Cooling System Code	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP	BC CCASHP
Ventilation System Code	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 60	HRV sre 75	HRV sre 75
DHW System Code	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas	NBC HotWater gas
Drain Water Heat Recovery Code	none	none	none	none	none	none	none	none	none	none
Heating Cooling System Cost of Upgrade	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.	$ 31,500.
Ventilation System Cost of Upgrade	$ 18,000.	$ 18,000.	$ 18,000.	$ 18,000.	$ 18,000.	$ 13,600.	$ 18,000.	$ 13,600.	$ 18,000.	$ 18,000.
DHW System Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.
Drain Water Heat Recovery Cost of Upgrade	$.	$.	$.	$.	$.	$.	$.	$.	$.	$.

Appendix D: GHG Analysis Data Table Reports

Draft carbon pollution standards for Part 3 buildings in British Columbia

DATA TABLES

BUILDING AND SAFETY STANDARDS BRANCH, PROVINCE OF BRITISH COLUMBIA

Last revised: September 28, 2022

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Preface

The following high-level summaries for Part 3 buildings are designed to isolate and highlight some potential financial and technical implications of a tiered carbon pollution standard for buildings in British Columbia which local governments may opt-in to.

This document is meant to be an initial costing analysis by illustrating whether decarbonizing a hypothetical building is cost effective across climate zones in B.C.

This document should not be considered an exhaustive costing study to meet the carbon pollution steps in your area. This analysis is not representative of all buildings in all situations.

Local governments and the construction industry should conduct more detailed or specific costing analysis which builds on this initial analysis.

The analysis prioritizes the most commonly built archetypes and scenarios; therefore, not all Steps were analyzed for all climate zones. Excel files with analysis from the Metrics Research Report update will be made available once the report and analysis are complete so stakeholders may conduct their own analysis.

Document format

The following pages contain:

- A proposed table of GHGI targets that could be inserted into the BC Building Code
- An example of how several buildings would meet the carbon pollution Steps

Authors and sources

The report was written by the Building and Safety Standards Branch of the Province of British Columbia, using data and analysis from the 2021 update to the BC Energy Step Code Metrics Research Report, written by Evoke Buildings and E3 Eco Group. More examples may be found in the Metrics Research Report. Thanks to Alex Blue, Einar Halbig, Donald Fast, and M'Beth Schoenfeld.

Assumptions

- *Electricity emissions factor: 0.011kg CO2e/kWh as listed currently in the BC Building Code*
- *Natural Gas emissions factor: 0.185kg CO2e/kWh as listed currently in the BC Building Code*
- *Renewable gas emissions factor: 0.001kg CO2e/kWh (converted from 0.29kg CO2e/GJ as described in the BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions and rounded to the nearest thousandth)*
- *Cost of 100% conventional natural gas: $0.042 $/kWh*
- *Cost of 100% RNG blend: $0.066 $/kWh*
- *Cost of BC Hydro residential electricity: $0.094 $/kWh (Step 1) or $0.141 $/kWh (Step 2)*
- *Cost of BC Hydro commercial electricity: $0.068 $/kWh + 12.4 $/kW*
- *Carbon tax rate: $45 in 2021, $50 in 2022, Linear increase to $170 in 2030 Escalate to $300 at final year of 20 year period (linear increase $13/year)*
- *Annual utility costs consider an annual average rate over 20 years, including a 2% per year utility escalation rate and a 3% discount rate.*

Other assumptions:

- *Other costing data, such as panel size or service upgrade charges, are not included in this analysis given the unique nature of those costs to each project.*
- *Electric vehicle (EV) charging is not included in energy models.*
- *Cooling was included in all Part 3 models; MURBs may not be designed with this in all cases, however the operating GHG impact is very small.*
- *Heat pump domestic hot water heaters were not modeled in this study; these are likely to be a common and viable decarbonisation measure but were excluded to reduce modelling runs.*
- *All values throughout this document, as well as potential GHGI targets and compliance paths, use modeled values, which may differ from eventual metered results.*
- *Equipment efficiencies:*
    - *DHW: electric tank (0.82 EF), natural gas tank (0.67 EF), natural gas tankless (0.95 EF), ASHP integrated tank (1.90 EF)*
    - *Space Heating: natural gas furnace (95% AFUE), electric baseboard, Cold Climate ASHP for CZs 6-8 (COPs from NRCan calculator based on NEEP data) with back up heat same as base case if needed, regular heat pump for CZs 4 and 5 (HSPF 7.1/SEER 14.5) with back up heat same as base case if needed*
- *Financial incentives were not included in this analysis as they change frequently*

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Approach

Three levels of target

The GHG Targets are set as follows:

- Medium: intended to require decarbonization of one major system (space heating or hot water).
- Low: intended to require both major systems to decarbonize, but still allows for high-carbon fuel backup heating, cooking loads, or similar.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

Intensity targets (GHGI)

The targets are set using an intensity metric, similar to the existing TEUI and TEDI Step Code metrics, which scale by floor area.

Reasoning

Three levels of target

- Each GHG target is set at a level which drives a technology or design choice towards lower carbon fuels.

Intensity targets (GHGI)

- Part 3 buildings vary widely in size, and their energy use generally tracks with size (i.e. there is not a substantial portion of fixed loads that stay the same regardless of size).

Proposed Targets

(all GHGI targets in $kgCO_2e/m^2/year$)	Medium	Low	Zero Carbon Ready
MURB	7	3	1.8
Office	5	3	1.5
Retail	6	3	2
Hotel	9	4	2

Rationale for Targets

Initial discussion on targets centred around a 6/3/1 set of targets. This format is generally adhered to, however some changes for individual archetypes have been suggested above to better target the desired level of decarbonization measures, while remaining achievable without requiring renewables such as solar photovoltaics.

Maximum TEUI/TEDI by Step

First, targets are analyzed based on a simple spreadsheet calculation using the existing Step Code TEUI and TEDI targets, combined with domestic hot water usage modeled in the archetype models. Using these existing targets, and assigning heating and DHW to a high-carbon fuel as an initial baseline (and assuming a 95% condensing boiler for heating), and assuming the rest of the energy use allowable in the TEUI uses a low-carbon fuel given connection to the electrical grid, the following GHGI values (in kgCO2e/m2/year) are seen. This could be considered a “typical worst case” as it uses the maximum allowable TEUI and TEDI for each Step; many projects would be expected to be below those maximums in reality.

The initial targets are set using an allowance based on these maximums, then validated against archetype modelling, described below.

This analysis is summarized below, with levels that would be achieved with each decarbonization measure shown shaded in green.

Target levels

- Each Step and climate zone shows an option to use decarbonization to meet proposed targets at the appropriate decarbonization measures and Steps. In general targets appear to generate the desired outcomes.

- Ability to meet targets does not appear to depend substantially on climate zone but rather on employing effective use of low-carbon fuels. As such and for simplicity, we have proposed a single set of targets for all climate zones.
- Buildings which fully decarbonize would meet the currently proposed zero carbon ready targets. None would meet the initially proposed target of 1 $kgCO_2e/m^2$/year; significant TEUI savings (up to 50% below Step 2 and nearly 40% below Step 4), or use of renewable energy generation such as PV or wind power would be required if a target of 1 was set. This generally holds true in archetype modelling though the office archetype does show some high-efficiency options that would meet a GHGI of 1. All other archetypes do not.
- Office archetype modelling showed several instances of designs with high-carbon backup heating falling into the zero carbon ready targets, and was therefore reduced to 1.5 rather than matching other archetypes. Other archetypes may show similar outcomes in some cases but may have difficulty meeting 1.5 in colder climate zones and have been left as-is.

Impact of Steps

- This analysis also shows the generalized impact of increasing the Step on decarbonization.
- Targeted decarbonization measures have significantly greater impact on GHG savings, compared with much smaller impact from TEUI/TEDI Steps. When increasing Steps without employing targeted decarbonization measures, the carbon savings range from 12% - 30%. The use of decarbonization measures within the same energy Step is in the range of 76% - 92%.
- While moving to a higher energy Step for a particular project may assist in meeting thresholds where they are close, it is not expected to typically be the major driving factor of decarbonization measures selected or the number of decarbonization measures required.

Legend:
Medium
Low
Zero-Carbon Ready

GHGI (kgCO2e/m2/year)	Climate Zone	Step	DHW + Heat High Carbon Fuel	Heat Decarb	DHW Decarb	Fully Decarb
Office	4 - 7a	2	9.1	3.6	6.9	1.4
		3	6.9	3.2	4.8	1.1
Retail	4	2	7.8	2.3	7.4	1.9
		3	5.5	1.8	5.0	1.3
	5	2	7.8	2.3	7.4	1.9
		3	6.4	1.8	6.0	1.4
	6	2	10.6	2.3	10.1	1.9
		3	7.4	1.9	6.9	1.4
	7a	2	12.6	2.6	12.2	2.1

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GHGI (kgCO2e/m2/year)	Climate Zone	Step	DHW + Heat High Carbon Fuel	Heat Decarb	DHW Decarb	Fully Decarb
		3	9.4	2.1	9.0	1.7
Hotel/ Motel	4	2	20.7	15.2	7.4	1.9
		3	18.5	14.8	5.2	1.5
		4	17.4	14.6	4.1	1.3
	5	2	20.7	15.2	7.4	1.9
		3	18.7	14.9	5.4	1.6
		4	17.7	14.7	4.4	1.4
	6	2	20.7	15.2	7.4	1.9
		3	19.5	14.9	6.2	1.6
		4	18.0	14.7	4.7	1.4
	7a	2	21.0	15.2	7.7	1.9
		3	20.1	14.9	6.8	1.7
		4	18.5	14.9	5.3	1.6
Other Residential (Part 3)	4	2	15.4	7.1	9.7	1.4
		3	12.5	7.0	6.8	1.3
		4	9.5	6.8	3.8	1.1
	5	2	15.4	7.1	9.7	1.4
		3	13.4	7.0	7.7	1.3
		4	10.9	6.9	5.2	1.2
	6	2	16.3	7.2	10.6	1.5
		3	13.4	7.0	7.7	1.3
		4	10.9	6.9	5.2	1.2
	7a	2	17.2	7.2	11.6	1.5
		3	14.3	7.0	8.6	1.3
		4	10.9	6.9	5.2	1.2
	7b	2	18.3	7.3	12.6	1.7
		3	16.4	7.2	10.7	1.5
		4	13.5	7.1	7.8	1.4
	8	2	24.1	7.7	18.5	2.0
		3	21.2	7.4	15.5	1.8
		4	18.2	7.2	12.5	1.5

Renewable Natural Gas Analysis

Using renewable natural gas (RG or RNG) can lower the carbon emissions of a building compared to conventional natural gas. This document includes an analysis illustrating the potential blend of renewable gas (RG or RNG) required to achieve the same stepped GHGI targets if all-gas equipment were used.

The use of RNG to meet the GHGI thresholds would only be available if the RNG were purchased in such a way that the building would permanently use low-carbon fuels regardless of change in owner or ratepayer. The annual modelled utility cost of RNG assumes an unlimited supply and is based on rates accurate at the time of writing.

The archetype examples below focus primarily on electrification decarbonization measures; the energy and cost implications for these measures are more complex and require significant analysis to understand.

Renewable natural gas (RNG) decarbonization measures are much simpler from an analysis perspective:

- Use of RNG does not require changes to natural gas baseline equipment and therefore do not incur incremental capital costs.
- Utility cost of RNG in the analysis ends up cost neutral with natural gas once escalating carbon taxes over a 20-year period are accounted for (see assumptions above for more detail.)
- Thus, RNG becomes a simple 1:1 substitution for the modeled base case, which is typically natural gas.
- The main issue considered is therefore what blend of RNG, as a percentage of total natural gas, would be sufficient to meet GHG targets? This is shown below.

The percentage of RNG required to meet targets is shown as a range because it will typically depend on the climate zone, with warmer climate zones requiring a lower percentage and colder climate zones requiring a higher percentage. The percentage required will vary with project specifics and design, for example a design that reduces natural gas heating loads would require a lower percentage of RNG. The below should be considered as a non-exhaustive example only. The below uses Step 2 as a base case.

Archetype	**% RNG to meet Medium GHG Target**	**% RNG to meet Low GHG Target**	**% RNG to meet Zero-Carbon Ready GHG Target**
MURB (high and low rise)	50% - 70%	75% - 85%	90% – 95%
Office	50%	75%	95%
Retail	30% - 60%	75% - 85%	90% – 95%
Hotel	60%	85% - 90%	95% - 97%

Examples of Archetypes

The tables below contain examples of modeled greenhouse gas emissions for a particular archetype, location, and set of design measures. The “base case” within the table uses a high-carbon fuel and approximately Step 2 design measures (envelope, heat recovery) to set an initial baseline prior to decarbonization. Decarbonization measures are then applied to heating and domestic hot water, separately and in combination. This is not an exhaustive list of options to meet targets but is meant to demonstrate a few example points, with key metrics including incremental capital cost, utility cost, and the GHG target level achieved.

Targets Achieved

- Each archetype shows at least one fully decarbonized, zero carbon ready option.
- Designs using one decarbonization measure generally meet medium targets, as expected. In some cases a particular measure (either heating or DHW) must be used.
- Designs using high-carbon backup heating fuel generally achieve the Low target, as expected. There are some cases where they meet either Medium or Zero Carbon ready; these targets fall into a narrow range with some overlap.

Cost Impacts

- Costs for decarbonization remain within 2.5% for all archetypes modelled, to reach Zero Carbon Ready.
- The cost difference between decarbonization measures for Climate Zone 7a versus 4 is consistently between 0.2% - 0.3% across all archetypes considered. This is further discussed below but suggests a bookending approach to Part 3 decarbonization cost considerations and modelling is appropriate.

Mixed Use Buildings

Mixed use buildings have not been modeled within these data sheets; it is anticipated that they would follow the procedure outlined in the City of Vancouver Energy Modelling Guidelines

Impact of Steps

A Step 2 base case as well as the impacts of higher Steps are shown for all archetypes. Key observations from this analysis are summarized here.

- Achieving a higher Step will reduce annual heating loads (TEDI) as well as overall energy (TEUI). This leads to carbon reductions, particularly if the heating is supplied by a high-carbon fuel.
- However, efficiency improvements are not a substitute for targeted decarbonization measures. While projects are likely to employ both in combination to some extent, decarbonization measures and targets require over 30% reductions in carbon between levels, and in many cases greater reductions from typical design to even the Medium target. 30% or greater reduction in energy use beyond Step 2 is significant and would require substantial design interventions (this would mean reducing EUI from Step 2 to somewhat below Step 4 for a MURB.) On the other hand, employing the use of targeted decarbonization measures including RNG and electrification can readily achieve those levels.
- As such, the below archetype analysis focusses on targeted decarbonization measures, including RNG and electrification measures.
- However, significant impacts for a design employing a higher Step would include:
    - Reduced operating costs (via a reduction in load).
    - Potential for reduced equipment size

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The below table provides the average incremental capital cost (ICC), for the 10 lowest ICC options for each archetype, Step, and climate zone, prior to applying any decarbonization measures. This can be considered along with the decarbonization costs in the data tables below.

	Lowest ICC Options for each Step prior to Decarbonization						
	Step	CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
Hotel	1	0%	0.3%	0.5%	0.1%	0.2%	-4.4%
	2	0.5%	0.8%	1.8%	1.8%	3.3%	5.6%
	3	2.6%	1.3%	3.9%	3.8%	7%	11.4%
	4	N/A	7.3%	9.1%	6.1%	12.1%	N/A
High MURB	1	-0.4%	-0.4%	-0.3%	-0.1%	Not run	Not run
	2	-0.3%	0.3%	0.8%	1.3%	Not run	Not run
	3	0.3%	0.4%	2.6%	4.4%	Not run	Not run
	4	1.8%	2%	10%	12.5%	Not run	Not run
Low MURB	1	-0.4%	-0.4%	-0.3%	-0.2%	0	-0.6
	2	-0.4%	0.2%	0.5%	0.3%	0.7	0.3
	3	0.2%	0.2%	1.2%	1.6%	2.8	1.9
	4	1.1%	1%	3.2%	5.5%	6.8	4
Office	1	-1.9%	-2.3%	-2.4%	-1.8%	Not run	Not run
	2	-2.4%	-2.3%	-2.1%	-0.2%	Not run	Not run
	3	-2.4%	-2.1%	-1.4%	1.3%	Not run	Not run
Retail	1	-8.8%	-10%	-10.5%	-6.4%	Not run	Not run
	2	-9.1%	-9.5%	-9.3%	-6.6%	Not run	Not run
	3	-8.9%	-9.4%	-8.7%	-6%	Not run	Not run

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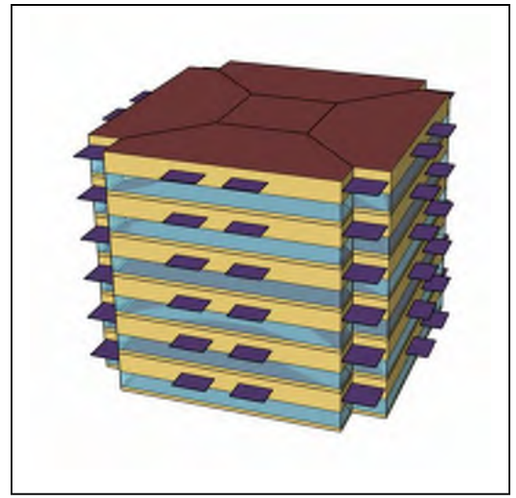
Low-rise multi-unit residential building (MURB) Archetype

Base case

- 100% conventional natural gas (to isolate changes and costs related to carbon requirements)
- Vertical surface area to floor area ratio (VFAR): 0.6
- Medium density (approx. 55m^2 average unit size)
- Cooling equipment: Packaged terminal air conditioner (PTAC) units in suites, or fan coils if heating system is FC.



In some cases, energy costs shown for ASHP cases are higher than those shown for electric baseboard cases. Savings are expected due to better heating efficiency in the ASHP case. However, the base model for the ASHP case includes conservative (NECB baseline) fan power which increases utility costs for this case. In design scenarios using improved fan designs utility cost savings would be anticipated.

Step	ECM	Climate Zone 4	Climate Zone 5	Climate Zone 6	Climate Zone 7a	Climate Zone 7b	Climate Zone 8
Base Case: Step 2	Walls	R-7	R-10	R-10	R-10	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	40%	20%	20%	20%
	Windows	USI 2.0	USI 1.6	USI 1.2	USI 1.2	USI 1.2	USI 1.6
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code
	HRV	60%	60%	80%	80%	80%	80%
Step 3	Walls	R-10	R-20	R-20	R-20	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	40%	40%	40%	20%
	Windows	USI 1.6	USI 1.6	USI 1.2	USI 0.8	USI 0.8	USI 1.2
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	Passive house level	50% savings vs code	50% savings vs code
	HRV	60%	60%	80%	80%	80%	80%
Step 4	Walls	R-20	R-20	R-20	R-40	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	20%	20%	20%	20%
	Windows	USI 1.2	USI 1.2	USI 0.8	USI 0.8	USI 0.8	USI 0.8
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	Passive house level	Passive house level	Passive house level
	HRV	80%	80%	80%	80%	80%	80%

Low-Rise MURB data tables: Climate Zone 4

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr		Medium 7 kgCO2e/m2/yr	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
	A	B			A	B		A	B		A	B		A	B		B	C
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●		
Electric baseboard			●		●				●		●				●		●	
Air-source heat pump; 30% natural gas backup				●						●				●				●
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [1]																		
High efficiency gas (95%)	●	●	●				●		●				●	●	●			
Electric resistance				●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	12.9	7.8	6.4	2.3	1.3	1.2	9.8	4.7	6.2	2.2	1.2	1.2	7	6.4	6.0	1.9	1.0	1.4
Annual modelled utility cost ($/m^2)	10.2	10.8	9.9	10	10.4	10.8	9.3	9.9	8.5	9.5	9.1	9.3	8.5	8.4	7.3	9.1	7.8	9.1
Total ICC vs. base case ($/m^2)	0	0	-3.4	42.4	-3.4	70.4	0	0	−3.4	42.4	-3.4	70.2	0	42.4	-3.4	0	-3.4	42.4
% ICC vs base case	0.0%	0.0%	-0.1%	1.4%	-0.1%	2.2%	0	0.0%	−0.1%	1.3%	-0.1%	2.2%	0.0%	1.4%	-0.1%	0.0%	-0.1%	1.4%
Net present value	N/A	-12	9.4	-38.4	-0.6	-82.4	Not calculated											

[1] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

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Low-Rise MURB data tables: Climate Zone 5

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●	●	
Electric baseboard			●		●				●		●				●			●
Air-source heat pump; 30% natural gas backup				●						●				●				
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [2]																		
High efficiency gas (95%)	●		●				●		●				●	●	●			
Electric resistance		●		●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11.6	6.6	6.4	2.9	1.3	1.3	10.4	5.4	6.3	2.5	1.2	1.3	8.1	6.8	6.2	3	1.1	1.8
Annual modelled utility cost ($/m^2)	10.5	11.1	9.7	10.5	10.2	10.2	10	10.6	9.1	10.2	9.7	9.9	9.4	9.1	8.1	10	8.7	9.9
Total ICC vs. base case ($/m^2)	0	0	−3.2	40.3	−3.2	66.7	0	0	−3.1	40.3	−3.1	66.8	0	40.3	−3.2	0	−3.2	40.3
% ICC vs base case	0.0%	0.0%	−0.1%	1.3%	−0.1%	2.1%	0	0.0%	−0.1%	1.3%	−0.1%	2.1%	0.0%	1.2%	−0.1%	0.0%	−0.1%	1.2%
Net present value	11.6	6.6	6.4	2.9	1.3	1.3	Not calculated											

[2] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Low-Rise MURB data tables: Climate Zone 6

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●		
Electric baseboard			●		●				●		●				●		●	
Air-source heat pump; 30% natural gas backup				●						●				●				●
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [3]																		
High efficiency gas (95%)	●		●				●		●				●	●	●			
Electric resistance		●		●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11	6	6.4	2.7	1.3	1.3	9.5	4.4	6.3	2.2	1.2	1.3	7.6	6.6	6.1	2.5	1.1	1.6
Annual modelled utility cost ($/m^2)	10.5	11.1	9.7	10.6	10.3	10.3	10	10.6	9	10.3	9.6	10.1	8.7	8.6	7.9	9.3	8.5	9.3
Total ICC vs. base case ($/m^2)	0	0	28.3	48.8	28.3	80.8	0	0	28.2	48.7	28.2	80.8	0	48.8	28.3	0	28.3	48.8
% ICC vs base case	0.0%	0.0%	0.9%	1.5%	0.9%	2.5%	0	0.0%	0.9%	1.5%	0.9%	2.5%	0.0%	1.5%	0.8%	0.0%	0.8%	1.5%
Net present value	Not calculated						Not calculated											

[3] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

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Low-Rise MURB data tables: Climate Zone 7a

	Step 2						Step 3							Step 4					
	None	Medium		Low	Zero-Carbon Ready		None	Medium			Low	Zero-Carbon Ready		None	Medium		Low	Zero-Carbon Ready	
	>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr			3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B	C		A	B		A	B		A	B
Space heating equipment																			
Gas condensing boiler with fan coils	●	●					●			●				All modeled options meet targets	●				
Electric baseboard			●		●				●			●				●		●	
Air-source heat pump; 30% natural gas backup				●				●											●
Air-source heat pump; no natural gas backup						●							●						
Water heating equipment [4]																			
High efficiency gas (95%)	●		●				●	●	●						●	●			
Electric resistance		●		●	●	●				●		●	●					●	●
Cost and performance data																			
Actual modelled GHGI	12.6	7.5	6.5	2.1	1.4	1.4	8.1	6.6	6.3	3.1		1.2	1.4		6.7	6.1		1.1	1.3
Annual modelled utility cost ($/m^2)	11	11.6	10.7	10.9	11.3	10.7	10.6	10.2	9.1	11		9.7	10.9		9.2	8.1		8.6	9.8
Total ICC vs. base case ($/m^2)	0	0	-3.8	48.8	-3.8	80.8	0	48.8	-3.8	0		-3.8	80.8		0	-3.9		-3.9	48.7
% ICC vs base case	0.0%	0.0%	-0.1%	1.5%	-0.1%	2.5%	0.0%	1.5%	-0.1%	0.0%		-0.1%	2.5%		0.0%	-0.1%		-0.1%	1.5%
Net present value	N/A	-12	9.8	-46.8	-2.2	-74.8		Not calculated											

[4] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Low-Rise MURB data tables: Climate Zone 7b

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●		●				●					
Electric baseboard			●		●			●			●				●		●	
Air-source heat pump; 30% natural gas backup				●						●				●		●		
Air-source heat pump; no natural gas backup						●						●						●
Water heating equipment [5]																		
High efficiency gas (95%)	●		●				●	●					●	●	●			
Electric resistance		●		●	●	●			●	●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11.5	6.4	6.5	2.9	1.5	1.5	10.3	6.4	5.2	2.6	1.4	1.4	8.4	7	5	2	1.2	1.4
Annual modelled utility cost ($/m^2)	11.3	11.9	10.9	11.6	11.4	11.4	11	10.4	11.6	11.4	11	11.2	10.5	10.3	9.1	11	9.6	10.9
Total ICC vs. base case ($/m^2)	0	0	4.8	63.7	4.8	105.5	0	17.4	0	63.7	17.4	105.5	0	63.7	23	63.7	23	105.5
% ICC vs base case	0.0%	0.0%	0.2%	2.0%	0.2%	3.3%	0.0%	0.5%	0.0%	2.0%	0.5%	3.3%	0.0%	1.9%	0.7%	1.9%	0.7%	3.3%
Net present value	Not calculated						Not calculated											

[5] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Low-Rise MURB data tables: Climate Zone 8

	Step 2						Step 3							Step 4					
	None	Medium		Low	Zero-Carbon Ready		None	Medium		Low	Zero-Carbon Ready			None	Medium		Low	Zero-Carbon Ready	
	>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr			>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr	
		A	B		A	B	A	B	A	B		A	B		A	B		A	B
Space heating equipment																			
Gas condensing boiler with fan coils	●						●	●						●	●				
Electric baseboard		●			●				●			●				●	●	●	
Air-source heat pump; 30% natural gas backup			●							●									
Air-source heat pump; no natural gas backup						●							●						●
Water heating equipment [6]																			
High efficiency gas (95%)	●	●					●		●					●		●			
Electric resistance			●		●	●		●		●		●	●		●		●	●	●
Cost and performance data																			
Actual modelled GHGI	15.1	6.8	4.2		1.7	1.7	13.6	8.5	6.7	3.7		1.7	1.6	9.6	7.5	6.5	2.4	1.5	1.5
Annual modelled utility cost ($/m^2)	13.2	13.1	13.8		13.7	13.8	12.8	13.4	12.5	13.3		13.1	13.3	11.6	11.3	10.8	12.2	11.4	12.2
Total ICC vs. base case ($/m^2)	0	-5	63.7		-5	105.6	0	0	−5	63.7		−5	105.6	0	63.7	−5.0	63.7	−5.0	105.5
% ICC vs base case	0.0%	-0.2%	2.0%		-0.2%	3.3%	0	0	−0.2%	2.0%		−0.2%	3.3%	0	1.9%	−0.20%	1.9%	−0.2%	3.2%
Net present value	N/A	-37	-119.7		-49	-161.6				Not calculated									

[6] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

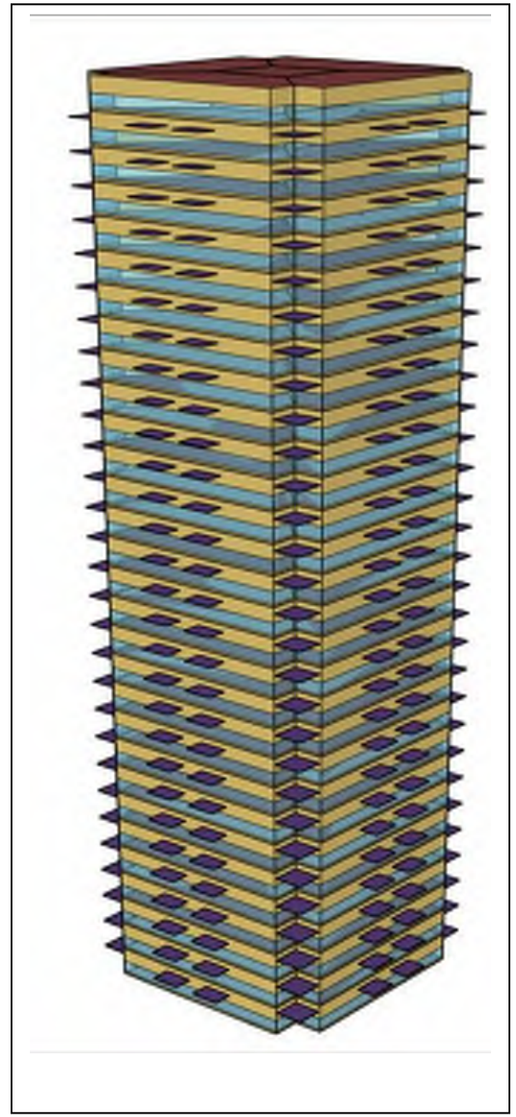
Last revised: September 28, 2022

High-rise multi-unit residential building (MURB) Archetype

Base case

- 100% conventional natural gas (to isolate changes and costs related to carbon requirements)
- Vertical surface area to floor area ratio (VFAR): 0.6
- Medium density (approx. 55m^2 average unit size)
- Cooling equipment: Packaged terminal air conditioner (PTAC) units in suites, or fan coils if heating system is FC

In some cases, energy costs shown for ASHP cases are higher than those shown for electric baseboard cases. Savings are expected due to better heating efficiency in the ASHP case. However, the base model for the ASHP case includes conservative (NECB baseline) fan power which increases utility costs for this case. In design scenarios using improved fan designs utility cost savings would be anticipated.



Step	ECM	Climate Zone 4	Climate Zone 5	Climate Zone 6	Climate Zone 7a	Climate Zone 7b	Climate Zone 8
Base Case: Step 2	Walls	R-7	R-10	R-10	R-10	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	40%	20%	20%	20%
	Windows	USI 2.0	USI 1.6	USI 1.2	USI 1.2	USI 1.2	USI 1.6
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code
	HRV	60%	60%	80%	80%	80%	80%
Step 3	Walls	R-10	R-20	R-20	R-20	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	40%	40%	40%	20%
	Windows	USI 1.6	USI 1.6	USI 1.2	USI 0.8	USI 0.8	USI 1.2
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	Passive house level	50% savings vs code	50% savings vs code
	HRV	60%	60%	80%	80%	80%	80%
Step 4	Walls	R-20	R-20	R-20	R-40	R-20	R-20
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	40%	40%	20%	20%	20%	20%
	Windows	USI 1.2	USI 1.2	USI 0.8	USI 0.8	USI 0.8	USI 0.8
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	Passive house level	Passive house level	Passive house level
	HRV	80%	80%	80%	80%	80%	80%

High-Rise MURB data tables: Climate Zone 4

	Step 2							Step 3						Step 4						
	None		Medium		Low	Zero-Carbon Ready		None	Medium		Low	Zero-Carbon Ready		None	Medium			Low	Zero-Carbon Ready	
	>7 kgCO2e/m2/yr		7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr			3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr	
	A	B	A	B		A	B		A	B		A	B		A	B	C		A	B
Space heating equipment																				
Gas condensing boiler with fan coils	●	●						●	●						●			●		
Electric baseboard			●			●				●		●					●		●	
Air-source heat pump; 30% natural gas backup				●							●					●				●
Air-source heat pump; no natural gas backup							●						●							
Water heating equipment [vii]																				
High efficiency gas (95%)	●		●					●							●	●	●			
Electric resistance		●		●		●	●		●		●	●	●					●	●	●
Cost and performance data																				
Actual modelled GHGI	11.7	7.8	7.8	3.2		1.3	1.2	9.8	4.7	6.2	2.2	1.2	1.2		7	6.4	6.0	1.9	1.0	1.4
Annual modelled utility cost ($/m^2)	10.2	10.8	10.8	9.9		10.4	9.5	9.3	9.9	8.5	9.5	9.1	9.3		8.5	8.4	7.3	9.1	7.8	9.1
Total ICC vs. base case ($/m^2)	0	0	0	42		-3	65	0	0	-3.3	42.4	-3.3	70.3		0	42.4	-3.3	0	-3.3	42.4
% ICC vs base case	0.0%	0.0%	0.0%	1.4%		-0.1%	2.1%	0.0%	0.0%	-0.1%	1.3%	-0.1%	2.2%		0.0%	1.4%	-0.1%	0.0%	-0.1%	1.4%
Net present value	N/A	-12	-12	-36		-1	-51	Not calculated												

[vii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

High-Rise MURB data tables: Climate Zone 5

	Step 2						Step 3						Step 4					
	None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr		None >7 kgCO2e/m2/yr	Medium 7 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.8 kgCO2e/m2/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●		
Electric baseboard			●		●				●		●				●		●	
Air-source heat pump; 30% natural gas backup				●						●				●				●
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [viii]																		
High efficiency gas (95%)	●		●				●		●				●	●	●			
Electric resistance		●		●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11.5	6.6	6.4	2.9	1.3	1.3	10.4	5.4	6.3	2.5	1.2	1.3	8.1	6.8	6.2	3	1.1	1.8
Annual modelled utility cost ($/m^2)	10.5	11.1	9.7	10.5	10.2	10.2	10	10.6	9.1	10.2	9.7	9.9	9.4	9.1	8.1	10	8.7	9.9
Total ICC vs. base case ($/m^2)	0	0	−3.2	40.3	−3.2	66.7	0	0	−3.2	40.3	−3.2	66.7	0	40.3	−3.1	0	−3.1	66.8
% ICC vs base case	0.0%	0.0%	−0.1%	1.2%	−0.1%	2.1%	0	0.0%	−0.1%	1.2%	−0.1%	2.1%	0.0%	1.3%	−0.1%	0.0%	−0.1%	2.1%
Net present value	Not calculated						Not calculated											

[viii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

High-Rise MURB data tables: Climate Zone 6

	Step 2						Step 3						Step 4					
	None	**Medium**		**Low**	**Zero-Carbon Ready**		**None**	**Medium**		**Low**	**Zero-Carbon Ready**		**None**	**Medium**		**Low**	**Zero-Carbon Ready**	
	>7 kgCO2e/m2/yr	**7 kgCO2e/m2/yr**		**3 kgCO2e/m2/yr**	**1.8 kgCO2e/m2/yr**		**>7 kgCO2e/m2/yr**	**7 kgCO2e/m2/yr**		**3 kgCO2e/m2/yr**	**1.8 kgCO2e/m2/yr**		**>7 kgCO2e/m2/yr**	**7 kgCO2e/m2/yr**		**3 kgCO2e/m2/yr**	**1.8 kgCO2e/m2/yr**	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas condensing boiler with fan coils	●	●					●	●					●			●		
Electric baseboard			●		●				●		●				●		●	
Air-source heat pump; 30% natural gas backup				●						●				●				●
Air-source heat pump; no natural gas backup						●						●						
Water heating equipment [ix]																		
High efficiency gas (95%)	●		●				●		●				●	●	●			
Electric resistance		●		●	●	●		●		●	●	●				●	●	●
Cost and performance data																		
Actual modelled GHGI	11	6	6.4	2.7	1.3	1.3	9.5	4.4	6.3	2.2	1.2	1.3	7.6	6.6	6.1	2.5	1.1	1.6
Annual modelled utility cost ($/m^2)	10.5	11.1	9.7	10.6	10.3	10.3	10	10.6	9	10.3	9.6	10.1	8.7	8.6	7.9	9.3	8.5	9.3
Total ICC vs. base case ($/m^2)	0	0	−3.8	48.8	−3.8	80.9	0	0	−3.8	48.8	−3.8	80.8	0	48.8	−3.8	0	−3.8	48.8
% ICC vs base case	0.0%	0.0%	−0.1%	1.5%	−0.1%	2.5%	0	0.0%	−0.1%	1.5%	−0.1%	2.5%	0.0%	1.5%	−0.1%	0.0%	−0.1%	1.5%
Net present value	Not calculated						Not calculated											

[ix] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

High-Rise MURB data tables: Climate Zone 7a

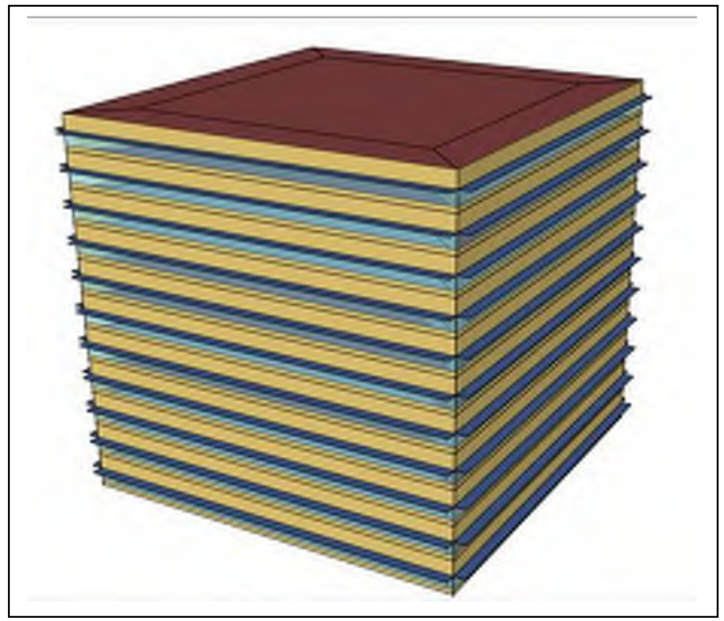
	Step 2							Step 3							Step 4					
	None		Medium		Low	Zero-Carbon Ready		None	Medium			Low	Zero-Carbon Ready		None	Medium		Low	Zero-Carbon Ready	
	>7 kgCO2e/m2/yr		7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr			3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr		>7 kgCO2e/m2/yr	7 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.8 kgCO2e/m2/yr	
			A	B		A	B		A	B	C		A	B		A	B		A	B
Space heating equipment																				
Gas condensing boiler with fan coils	●	●						●			●					●				
Electric baseboard			●			●				●			●		All modeled options meet targets		●		●	
Air-source heat pump; 30% natural gas backup				●					●											●
Air-source heat pump; no natural gas backup							●							●						
Water heating equipment [x]																				
High efficiency gas (95%)	●		●					●	●	●						●	●			
Electric resistance		●		●		●	●				●		●	●					●	●
Cost and performance data																				
Actual modelled GHGI	12.6	7.5	6.5	3.2		1.4	1.4	8.1	6.6	6.3	3.1		1.2	1.4		6.7	6.1		1.1	1.3
Annual modelled utility cost ($/m^2)	11	11.6	10.7	10.9		11.3	10.7	10.6	10.2	9.1	11		9.7	10.9		9.2	8.1		8.6	9.8
Total ICC vs. base case ($/m^2)	0	0	-3.8	49		-3.8	80.8	0	48.8	-43.6	0		-43.6	80.8		0	-3.8		-3.8	80.8
% ICC vs base case	0.0%	0.0%	-0.1%	1.5%		-0.1%	2.5%	0.0%	2.5%	-0.3%	0.0%		-0.3%	3.5%		0.0%	-0.1%		-0.1%	2.5%
Net present value	N/A	-12	9.8	-47		-2.2	-74.8				Not calculated									

[x] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Office Archetype

Base case

- 25% lighting savings
- 100% conventional natural gas (this will help us isolate changes and costs related to carbon requirements)



Step	ECM	Climate Zone 4	Climate Zone 5	Climate Zone 6	Climate Zone 7a
Base Case: Step 2	Walls	R-7	R-7	R-10	R-20
	Roof	R-40	R-40	R-40	R-20
	WWR	50%	50%	30%	30%
	Windows	USI 2.0	USI 2.0	USI 1.6	USI 1.2
	SHGC	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	No savings beyond code	No savings beyond code	50% savings vs code
	HRV	60%	80%	80%	80%
Step 3	Walls	R-10	R-10	R-10	R-20
	Roof	R-20	R-20	R-20	R-20
	WWR	30%	30%	30%	30%
	Windows	USI 2.0	USI 1.2	USI 1.2	USI 0.8
	SHGC	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	No savings beyond code	50% savings vs code	50% savings vs code
	HRV	80%	80%	80%	80%

Highlights from analysis

- DHW is fairly low for this archetype; larger focus on space heating.
- DHW heat pumps were not modeled but could be used; GHGI outcomes would typically be similar to electric resistance DHW heating, though the addition of a DHW heat pump in a conditioned space can increase heating loads and may impact overall GHGI depending on space heating fuel source. Project-specific modelling should be used to confirm impacts.

Office data tables: Climate Zone 4

	Step 2					Step 3				
	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A
Space heating equipment										
Gas condensing boiler with fan coils	●	●				●	●			
Air-source heat pump; 30% natural gas backup			●	●				●		●
Air-source heat pump; no natural gas backup					●					
Water heating equipment [xi]										
High efficiency gas (95%)	●		●			●		●		
Electric resistance		●		●	●		●			●
Cost and performance data										
Actual modelled GHGI	6	4.2	4	1.9	0.9	5.2	3.3	3.7		1.5
Annual modelled utility cost ($/m^2)	7.7	7.8	7.3	7.3	7	6.8	6.8	6.5		6.4
Total ICC vs. base case ($/m^2)	0	0	42	42	65	0	0	42.4		42.4
% ICC vs base case	0.0%	0.0%	1.4%	1.4%	2.1%	0.00%	0.0%	1.3%		1.3%
Net present value	N/A	-2	-34	-34	-51	0	-1	-35.8		-35.2

[xi] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Office data tables: Climate Zone 5

	Step 2					Step 3				
	None **>5 kgCO2e/m2/yr**	**Medium** **5 kgCO2e/m2/yr**		**Low** **3 kgCO2e/m2/yr**	**Zero-Carbon Ready** **1.5 kgCO2e/m2/yr**	**None** **>5 kgCO2e/m2/yr**	**Medium** **5 kgCO2e/m2/yr**		**Low** **3 kgCO2e/m2/yr**	**Zero-Carbon Ready** **1.5 kgCO2e/m2/yr**
		A	B		A		A	B		A
Space heating equipment										
Gas condensing boiler with fan coils	●	●				●	●		●	
Air-source heat pump; 30% natural gas backup			●	●				●		●
Air-source heat pump; no natural gas backup					●					
Water heating equipment [xii]										
High efficiency gas (95%)	●		●			●	●	●		
Electric resistance		●		●	●				●	●
Cost and performance data										
Actual modelled GHGI	6.8	4.7	4.1	2	0.8	5.4	3.2	3.7	1.5	0.8
Annual modelled utility cost ($/m^2)	8	8	7.4	7.3	7.1	7.5	7.4	7.1	7	6.9
Total ICC vs. base case ($/m^2)	0	0	40.3	40.3	66.8	0	0	40.3	40.3	66.7
% ICC vs base case	0.0%	0.0%	1.3%	1.3%	2.1%	0	0.0%	1.3%	1.3%	2.1%
Net present value	0	1	−28	−27	−48	0	0.7	−32.4	−31.7	−54.8

[xii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Office data tables: Climate Zone 6

	Step 2					Step 3				
	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A
Space heating equipment										
Gas condensing boiler with fan coils	●	●				●	●			
Air-source heat pump; 30% natural gas backup			●	●				●	●	●
Air-source heat pump; no natural gas backup					●					
Water heating equipment [xiii]										
High efficiency gas (95%)	●		●			●		●		
Electric resistance		●		●	●		●		●	●
Cost and performance data										
Actual modelled GHGI	7	4.8	4.1	2	0.8	5.6	3.4	3.7	1.6	0.8
Annual modelled utility cost ($/m^2)	8.3	8.3	7.7	7.6	7.4	7.9	7.8	7.4	7.4	7.2
Total ICC vs. base case ($/m^2)	0	0	48.8	48.8	80.8	0	0	48.8	48.8	80.8
% ICC vs base case	0.0%	0.0%	1.5%	1.5%	2.6%	0	0.0%	1.6%	1.6%	2.6%
Net present value	0	1	−36	−35	−62	0	0.7	−40.4	−39.7	−68.1

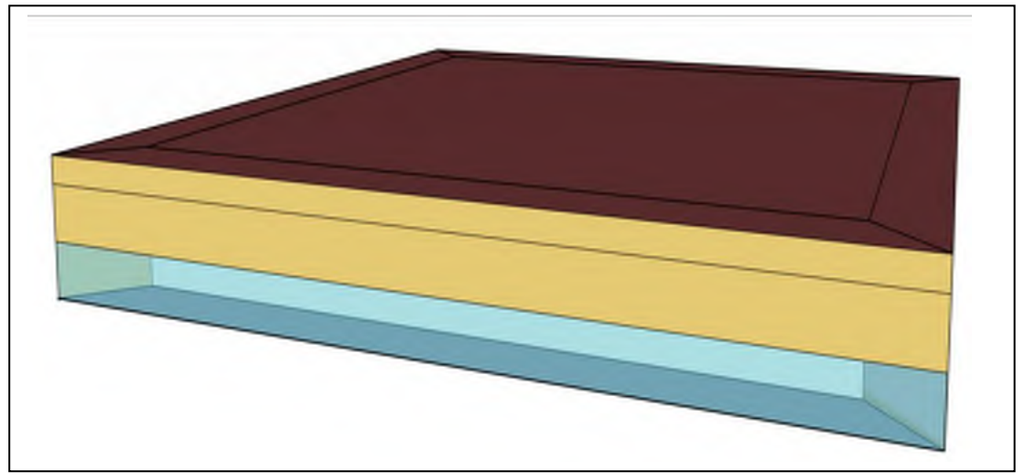
[xiii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Office data tables: Climate Zone 7a

	Step 2					Step 3				
	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr A	Medium 5 kgCO2e/m2/yr B	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr A
Space heating equipment										
Gas condensing boiler with fan coils	●	●				All modeled options meet targets	●		●	
Air-source heat pump; 30% natural gas backup			●	●				●		●
Air-source heat pump; no natural gas backup					●					
Water heating equipment [xiv]										
High efficiency gas (95%)	●		●				●	●		
Electric resistance		●		●	●				●	●
Cost and performance data										
Actual modelled GHGI	5.9	4.1	3.9	1.8	0.8		5.2	3.7	1.6	0.8
Annual modelled utility cost ($/m^2)	8.6	8.6	8.2	8.2	8		8.4	8.1	8.1	7.9
Total ICC vs. base case ($/m^2)	0	0	49	49	75		0	48.7	48.7	74.4
% ICC vs base case	0.0%	0.0%	1.6%	1.6%	2.4%		0.0%	1.6%	1.6%	2.4%
Net present value	N/A	0	-41	-41	-63					

[xiv] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Retail Archetype



Base case

- 100% conventional natural gas (to isolate changes and costs related to carbon requirements)
- 25% lighting savings vs NECB 2015
- Looking at Mall results rather than big box, as mall has higher GHGI.

Step	ECM	Climate Zone 4	Climate Zone 5	Climate Zone 6	Climate Zone 7a
Base Case: Step 2	Walls	R-10	R-20	R-20	R-20
	Roof	R-40	R-60	R-60	R-40
	WWR	20%	20%	20%	20%
	Windows	USI 2.0	USI 1.2	USI 1.2	USI 1.6
	SHGC	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	No savings beyond code	50% savings vs code	50% savings vs code
	HRV	60%	60%	60%	80%
Step 3	Walls	R-20	R-20	R-20	R-40
	Roof	R-60	R-60	R-60	R-60
	WWR	20%	20%	20%	20%
	Windows	USI 2.0	USI 2.0	USI 2.0	USI 0.8
	SHGC	0.3	0.3	0.3	0.3
	Infiltration	50% savings vs code	No savings beyond code	50% savings vs code	50% savings vs code
	HRV	60%	80%	80%	80%

Highlights from analysis

- GHGIs depend on space mix/archetype.
    - GHGIs are higher in malls than in big box stores (used malls in the table, difference on base case fully natural gas is approx. 1.7 GHGI; difference becomes negligible in lowest GHG cases)
- DHW is relatively low for this archetype; larger focus on space heating.
- DHW heat pumps were not modeled but could be used; GHGI outcomes would typically be similar to electric resistance DHW heating, though the addition of a DHW heat pump in a conditioned space can increase heating loads and may impact overall GHGI depending on space heating fuel source. Project-specific modelling should be used to confirm impacts.

Retail data tables: Climate Zone 4

	Step 2				Step 3					
	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr	
						A	B		A	B
Space heating equipment										
Gas condensing boiler with fan coils	●	●			All options modeled meet targets	●	●			
Air-source heat pump; 10% natural gas backup			●	●					●	●
Water heating equipment [xv]										
High efficiency gas (95%)	●		●			●			●	
Electric resistance		●		●			●			●
Cost and performance data										
Actual modelled GHGI	6.6	5.8	2.1	1.3		5	4.2		1.9	1.1
Annual modelled utility cost ($/m^2)	1.8	1.9	1.9	2		1.8	1.9		1.9	2
Total ICC vs. base case ($/m^2)	0	0	43	43		0	0		42.4	42.4
% ICC vs base case	0.0%	0.0%	1.2%	1.2%		0	0		0.2%	0.2%
Net present value	N/A	-2	-45	-47		0	-1.9		-43.9	-45.8

[xv] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Retail data tables: Climate Zone 5

	Step 2				Step 3					
	None	Medium	Low	Zero-Carbon Ready	None	Medium		Low	Zero-Carbon Ready	
	>5 kgCO2e/m2/yr	5 kgCO2e/m2/yr	3 kgCO2e/m2/yr	1.5 kgCO2e/m2/yr	>5 kgCO2e/m2/yr	5 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.5 kgCO2e/m2/yr	
		A				A	B		A	B
Space heating equipment										
Gas condensing boiler with fan coils	●	●			All options modeled meet targets	●	●		●	
Air-source heat pump; 10% natural gas backup			●	●						●
Water heating equipment [xvi]										
High efficiency gas (95%)	●		●			●			●	
Electric resistance		●		●			●			●
Cost and performance data										
Actual modelled GHGI	6.7	6	2.1	1.4		4.4	3.7		1.9	1.1
Annual modelled utility cost ($/m^2)	2	2.1	2.1	2.2		2	2.1		2	2.1
Total ICC vs. base case ($/m^2)	0	0	40.3	40.3		0	0		40.3	40.3
% ICC vs base case	0.0%	0.0%	80.4%	1.2%		0	0		0.012	0.012
Net present value	0	−2	−42.6	−44.5		0	−1.9		−41.5	−43.4

[xvi] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Retail data tables: Climate Zone 6

	Step 2					Step 3					
	None >5 kgCO2e/m2/yr		Medium 5 kgCO2e/m2/yr	Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr	None >5 kgCO2e/m2/yr	Medium 5 kgCO2e/m2/yr		Low 3 kgCO2e/m2/yr	Zero-Carbon Ready 1.5 kgCO2e/m2/yr	
	A	B					A	B		A	B
Space heating equipment											
Gas condensing boiler with fan coils	●	●				All options modeled meet targets	●	●			
Air-source heat pump; 10% natural gas backup				●	●					●	●
Water heating equipment [xvii]											
High efficiency gas (95%)	●			●			●			●	
Electric resistance		●			●			●			●
Cost and performance data											
Actual modelled GHGI	8.3	7.6		2.3	1.6		5.4	4.6		2	1.3
Annual modelled utility cost ($/m^2)	2	2.1		2.1	2.2		2	2.1		2.1	2.2
Total ICC vs. base case ($/m^2)	0	0		48.8	48.8		0	0		48.8	48.8
% ICC vs base case	0.0%	0.0%		1.4%	1.4%		0	0		0.014	0.014
Net present value	0	−2		−51.9	−53.8		0	−2.1		−50.6	−52.5

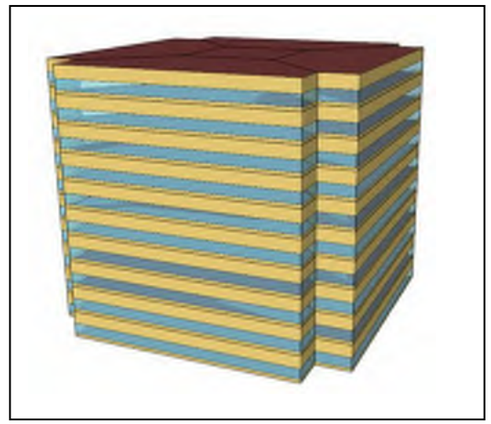
[xvii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Retail data tables: Climate Zone 7a

	Step 2				Step 3					
	None	Medium	Low	Zero-Carbon Ready	None	Medium		Low	Zero-Carbon Ready	
	>5 kgCO2e/m2/yr	5 kgCO2e/m2/yr	3 kgCO2e/m2/yr	1.5 kgCO2e/m2/yr	>5 kgCO2e/m2/yr	5 kgCO2e/m2/yr		3 kgCO2e/m2/yr	1.5 kgCO2e/m2/yr	
						A	B	B		B
Space heating equipment										
Gas condensing boiler with fan coils	●	●			All options modeled meet	●	●			
Air-source heat pump; 10% natural gas backup			●	●				●	●	●
Water heating equipment [xviii]										
High efficiency gas (95%)	●		●			●		●		
Electric resistance		●		●			●		●	●
Cost and performance data										
Actual modelled GHGI	7.7	6.9	2.4	1.7		5.1	4.4	2.1	1.4	1.3
Annual modelled utility cost ($/m^2)	2.4	2.5	2.6	2.7		2.4	2.5	2.5	2.6	2.2
Total ICC vs. base case ($/m^2)	0	0	48	48		0	0	48.8	48.8	48.8
% ICC vs base case	0.0%	0.0%	1.4%	1.4%		0.0%	0.0%	1.4%	1.4%	0.014
Net present value	N/A	-2	-52	-54		0	-1.9	-51	-52.9	-52.5

[xviii] Heat pump water heaters were not included in this analysis because they were not included in the modelling completed for the 2021 Metrics Report Update

Hotel Archetype



Base case

- 100% conventional natural gas (to isolate changes and costs related to carbon requirements)
- 20% lighting savings
- Pool heating fuel source matches the building heating fuel source
- Systems are 4-pipe fan coils with dedicated outdoor air system (DOAS)

Highlights from analysis

- There is higher laundry use in these archetypes (10%+ of energy use), so laundry energy source affects GHGI.
- DHW heat pumps were not modeled but could be used; GHGI outcomes would typically be similar to electric resistance DHW heating, though the addition of a DHW heat pump in a conditioned space can increase heating loads and may impact overall GHGI depending on space heating fuel source. Project-specific modelling should be used to confirm impacts.

Step		Climate Zone 4	Climate Zone 5	Climate Zone 6	Climate Zone 7a	Climate Zone 7b	Climate Zone 8
Base Case: Step 2	Walls	R-10	R-10	R-15	R-20	R-30	R-30
	Roof	R-20	R-20	R-40	R-40	R-40	R-40
	WWR	30%	30%	30%	30%	30%	30%
	Windows	USI 2.0	USI 2.0	USI 1.6	USI 1.2	USI 1.2	USI 0.8
	SHGC	0.3	0.3	0.3	0.3	0.3	0.3
	Infiltration	No savings beyond code	No savings beyond code	50% savings vs code	50% savings vs code	50% savings vs code	Passive house infiltration
	HRV	60%	90%	90%	90%	90%	90%
	Lighting Savings	20%	20%	20%	20%	20%	20%
Step 3	Walls	R-15	R-20	R-20	R-30	R-30	R-30
	Roof	R-40	R-40	R-40	R-40	R-40	R-40
	WWR	30%	30%	30%	30%	30%	30%
	Windows	USI 1.6	USI 1.6	USI 1.2	USI 1.2	USI 0.8	USI 0.8
	SHGC	0.3	0.3	0.3	0.3	0.3	0.4
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code	50% savings vs code	Passive house infiltration
	HRV	60%	90%	90%	90%	90%	90%
	Lighting Savings	40%	40%	40%	40%	40%	20%
Step 4	Walls	R-15	R-20	R-30	R-30	R-30	No simulated options meet
	Roof	R-40	R-40	R-40	R-40	R-40	
	WWR	30%	30%	30%	30%	30%	
	Windows	USI 1.2	USI 1.2	USI 0.8	USI 0.8	USI 0.8	
	SHGC	0.3	0.3	0.3	0.3	0.3	
	Infiltration	50% savings vs code	50% savings vs code	50% savings vs code	Passive house infiltration	Passive house infiltration	
	HRV	90%	90%	90%	90%	90%	
	Lighting Savings	40%	40%	40%	40%	20%	

Hotel data tables: Climate Zone 4

	Step 2								Step 3					Step 4			
	None >9 kgCO2e/m2/yr				Medium 9 kgCO2e/m2/yr		Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr	None >9 kgCO2e/m2/yr		Medium 9 kgCO2e/m2/yr	Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr	None >9 kgCO2e/m2/yr	Medium 9 kgCO2e/m2/yr	Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr
	A	B	C	D	A	B			A	B							A
Space heating equipment																	
Gas condensing boiler with fan coils	●	●	●		●				●		●			●	●		
Air-source heat pump; 30% natural gas backup				●		●	●			●		●				●	
Air-source heat pump supplies all heating								●					●				●
Water Heating Equipment																	
High efficiency gas (95%)	●		●	●					●	●				●			
Electric resistance		●			●	●	●	●			●	●	●		●	●	●
Laundry Fuel																	
Gas	●	●				●			●	●				●			
Electricity			●	●	●		●	●			●	●	●		●	●	●
Cost and performance data																	
Actual modelled GHGI	20.5	15.7	12.9	10.9	8.1	8	3.3	1.6	19.5	15.3	7.2	3	1.6	18.1	5.7	2.5	1.5
Annual modelled utility cost ($/m^2)	11.8	11.7	12	11.1	11.9	10.8	11	10.6	11.1	10.3	11.1	10.5	10.2	10.6	10.7	10.1	9.9
Total ICC vs. base case ($/m^2)	0	0	0	42	0	42	42	65	0	42.4	0	42.4	70.2	0	0	42.4	70.2
% ICC vs base case	0.0%	0.0%	0.0%	1.3%	0.0%	1.3%	1.3%	2.0%	0	1.3%	0.0%	1.3%	2.2%	0.0%	0.0%	1.3%	2.1%
Net present value	N/A	2	-4	-28	-2	-22	-26	-41	0	-27.6	2	-28.2	-49.7	0	2	-30.1	-53.5

Hotel data tables: Climate Zone 5

	Step 2					Step 3					Step 4			
	None >9 kgCO2e/m2/yr		Medium 9 kgCO2e/m2/yr	Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr	None >9 kgCO2e/m2/yr		Medium 9 kgCO2e/m2/yr	Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr	None >9 kgCO2e/m2/yr	Medium 9 kgCO2e/m2/yr	Low 4 kgCO2e/m2/yr	Zero-Carbon Ready 2 kgCO2e/m2/yr
	A	B				A	B							
Space heating equipment														
Gas condensing boiler with fan coils	●		●			●		●			●	●		
Air-source heat pump; 30% natural gas backup		●		●			●		●				●	
Air-source heat pump supplies all heating					●					●				●
Water Heating Equipment														
High efficiency gas (95%)	●	●				●	●				●			
Electric resistance			●	●	●			●	●	●		●	●	●
Laundry Fuel														
Gas	●	●				●	●				●			
Electricity			●	●	●			●	●	●		●	●	●
Cost and performance data														
Actual modelled GHGI	20.9	15.8	8.6	3.4	1.6	18.9	15.1	6.6	2.8	1.6	18.4	6.1	2.6	1.6
Annual modelled utility cost ($/m^2)	12.3	11.4	12.4	11.6	11	11.1	10.5	11.2	10.7	10.4	10.9	11	10.6	10.3
Total ICC vs. base case ($/m^2)	0	40.3	0	40.3	66.8	0	40.3	0	40.3	66.8	0	0	40.3	66.8
% ICC vs base case	0.0%	1.2%	0.0%	1.2%	2.0%	0	1.2%	0.0%	1.2%	2.0%	0.0%	0.0%	1.2%	2.0%
Net present value	0	-21.5	2.1	-22.1	-37.8	0	-27.5	2	-28.2	-49.1	0	2.1	-29.7	-51.4

Hotel data tables: Climate Zone 6

	Step 2					Step 3					Step 4			
	None		Medium	Low	Zero-Carbon Ready	None		Medium	Low	Zero-Carbon Ready	None	Medium	Low	Zero-Carbon Ready
	>9 kgCO2e/m2/yr		9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr	>9 kgCO2e/m2/yr		9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr	>9 kgCO2e/m2/yr	9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr
	A	B				A	B							
Space heating equipment														
Gas condensing boiler with fan coils	●		●			●		●			●	●		
Air-source heat pump; 30% natural gas backup		●		●			●		●				●	
Air-source heat pump supplies all heating					●					●				●
Water Heating Equipment														
High efficiency gas (95%)	●	●				●	●				●			
Electric resistance			●	●	●			●	●	●		●	●	●
Laundry Fuel														
Gas	●	●				●	●				●			
Electricity			●	●	●			●	●	●		●	●	●
Cost and performance data														
Actual modelled GHGI	20.6	15.6	8.2	3.3	1.6	19.8	15.3	7.4	3	1.5	18.6	6.3	2.6	1.5
Annual modelled utility cost ($/m^2)	11.6	10.7	11.8	10.8	10.4	11	10.2	11.1	10.3	10	10.6	10.7	10.1	9.8
Total ICC vs. base case ($/m^2)	0	48.8	0	48.8	80.8	0	48.8	0	48.8	80.8	0	0	48.8	80.9
% ICC vs base case	0.0%	1.5%	0.0%	1.5%	2.5%	0	1.5%	0.0%	1.5%	2.5%	0.0%	0.0%	1.5%	2.5%
Net present value	0	-31.2	-0.6	-29.1	-53.7	0	-33.5	2	-31.4	-56.9	0	2	-34.9	188.5

Hotel data tables: Climate Zone 7a

	Step 2								Step 3				Step 4			
	None >9 kgCO2e/m2/yr				Medium 9 kgCO2e/ m2/yr		Low 4 kgCO2e /m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr	None >9 kgCO2e/ m2/yr	Medium 9 kgCO2e/ m2/yr	Low 4 kgCO2e/ m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr	None >9 kgCO2e/ m2/yr	Medium 9 kgCO2e/ m2/yr	Low 4 kgCO2e/ m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr
	A	B	C	D	A	B										
Space heating equipment																
Gas condensing boiler with fan coils	●	●	●		●				●	●			●	●		
Air-source heat pump; 30% natural gas backup				●		●	●				●				●	
Air-source heat pump supplies all heating								●				●				●
Water Heating Equipment																
High efficiency gas (95%)	●		●	●					●				●			
Electric resistance		●			●	●	●	●		●	●	●		●	●	●
Laundry Fuel																
Gas	●	●				●			●				●			
Electricity			●	●	●		●	●		●	●	●		●	●	●
Cost and performance data																
Actual modelled GHGI	20.8	13.2	16	11	8.4	8.1	3.4	1.6	20.3	7.9	3.2	1.6	18.8	6.5	2.7	1.6
Annual modelled utility cost ($/m^2)	11.7	11.6	11.9	11.1	11.8	10.8	11	10.6	11.5	11.5	10.9	10.6	10.7	10.8	10.4	10.2
Total ICC vs. base case ($/m^2)	0	0	0	49	0	49	49	75	0	0	48.8	80.8	0	0	48.8	80.9
% ICC vs base case	0.0%	0.0%	0.0%	1.5%	0.0%	1.5%	1.5%	2.3%	0.0%	0.0%	1.5%	2.5%	0.0%	0.0%	1.5%	2.4%
Net present value	N/A	2	-4	-37	-2	-31	-35	-53	0	2	61	-60.6	0	2.1	-38.6	-66

Hotel data tables: Climate Zone 7b

	Step 2					Step 3				Step 4			
	None		Medium	Low	Zero-Carbon Ready	None	Medium	Low	Zero-Carbon Ready	None	Medium	Low	Zero-Carbon Ready
	>9 kgCO2e/m2/yr		9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr	>9 kgCO2e/m2/yr	9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr	>9 kgCO2e/m2/yr	9 kgCO2e/m2/yr	4 kgCO2e/m2/yr	2 kgCO2e/m2/yr
	A	B											
Space heating equipment													
Gas condensing boiler with fan coils	●	●				●	●			●	●		
Air-source heat pump; 30% natural gas backup				●				●				●	
Air-source heat pump supplies all heating					●				●				●
Water Heating Equipment													
High efficiency gas (95%)	●					●				●			
Electric resistance		●		●	●		●	●	●		●	●	●
Laundry Fuel													
Gas	●					●				●			
Electricity		●		●	●		●	●	●		●	●	●
Cost and performance data													
Actual modelled GHGI	21.7	9.3		3.7	1.7	21	8.7	3.4	1.6	19.7	7.4	3	1.6
Annual modelled utility cost ($/m^2)	12.1	12.2		11.4	11	11.6	11.6	10.9	10.5	11.4	11.5	10.9	10.6
Total ICC vs. base case ($/m^2)	0	0		63.7	105.6	0	0	63.7	105.5	0	0	63.7	105.5
% ICC vs base case	0.0%	0.0%		1.9%	3.2%	0.0%	0.0%	1.9%	3.2%	0.0%	0.0%	1.9%	3.2%
Net present value	0	2.1		-44.9	-79.6	0	2	-46.5	-81.8	0	2.1	-49.7	-86.4

Hotel data tables: Climate Zone 8

	Step 2				Step 3				Step 4			
	None >9 kgCO2e/ m2/yr	Medium 9 kgCO2e/ m2/yr	Low 4 kgCO2e/ m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr	None >9 kgCO2e/ m2/yr	Medium 9 kgCO2e/ m2/yr	Low 4 kgCO2e /m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr	None >9 kgCO2e /m2/yr	Medium 9 kgCO2e/ m2/yr	Low 4 kgCO2e /m2/yr	Zero-Carbon Ready 2 kgCO2e/ m2/yr
Space heating equipment												
Gas condensing boiler with fan coils	●	●			●	●			None meet			
Air-source heat pump; 30% natural gas backup			●				●					
Air-source heat pump supplies all heating				●				●				
Water Heating Equipment												
High efficiency gas (95%)	●				●							
Electric resistance		●	●	●		●	●	●				
Laundry Fuel												
Gas	●				●							
Electricity		●	●	●		●	●	●				
Cost and performance data												
Actual modelled GHGI	20.9	8.6	3.4	1.7	20.7	8.4	3.4	1.7				
Annual modelled utility cost ($/m^2)	12	12	11.4	11.1	12.2	12.2	11.6	11.3				
Total ICC vs. base case ($/m^2)	0	0	63.7	105.5	0	0	63.7	105.5				
% ICC vs base case	0.0%	0.0%	2.0%	3.2%	0.0%	0.0%	2.0%	3.2%				
Net present value	0	2	-48.2	-84.2	0	2.1	-48.6	-84.9				

Draft carbon pollution standards for Part 9 buildings in British Columbia

DATA TABLES

BUILDING AND SAFETY STANDARDS BRANCH, PROVINCE OF BRITISH COLUMBIA

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Preface

The following data tables for Part 9 buildings are designed to isolate and highlight some potential financial and technical implications of a tiered carbon pollution standard for buildings in British Columbia which local governments may opt-in to.

This document is meant to be an initial costing analysis by illustrating whether decarbonizing a hypothetical building is cost effective across climate zones in B.C.

This document should not be considered an exhaustive costing study to meet the carbon pollution steps in your area. This analysis is not representative of all buildings in all situations.

Local governments and the construction industry should conduct more detailed or specific costing analysis which builds on this initial analysis.

Not all Steps and archetypes were analyzed for all climate zones. Excel files with analysis from the Metrics Research Report update will be made available once the report and analysis are complete so interested parties may conduct their own analysis.

Document format

The following pages contain:

- A proposed table of GHGI/GHG targets that could be inserted into the BC Building Code
- An example of how several building would meet the carbon pollution Steps

Authors and sources

The report was written by the Building and Safety Standards Branch of the Province of British Columbia, using data and analysis from the 2021 update to the BC Energy Step Code Metrics Research Report, written by Evoke Buildings and E3 Eco Group. More examples may be found in the Metrics Research Report. Thanks to Alex Blue, Einar Halbig, Donald Fast, and M'Beth Schoenfeld.

Assumptions

- *Electricity emissions factor: 0.011kg CO2e/kWh as listed currently in the BC Building Code*
- *Natural Gas emissions factor: 0.185kg CO2e/kWh as listed currently in the BC Building Code*
- *Renewable gas emissions factor: 0.001kg CO2e/kWh (converted from 0.29kg CO2e/GJ as described in the BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions and rounded to the nearest thousandth)*
- *Cost of 100% conventional natural gas: $0.042 $/kWh*
- *Cost of 100% RNG blend: $0.066 $/kWh*
- *Cost of BC Hydro residential electricity: $0.094 $/kWh (Step 1) or $0.141 $/kWh (Step 2)*
- *Cost of BC Hydro commercial electricity: $0.068 $/kWh + 12.4 $/kW*
- *Carbon tax rate: $45 in 2021, $50 in 2022, Linear increase to $170 in 2030 Escalate to $300 at final year of 20 year period (linear increase $13/year)*

Other assumptions:

- *Other costing data, such as panel size or service upgrade charges, are not included in this analysis given the unique nature of those costs to each project.*
- *Electric vehicle (EV) charging is not included in energy models.*
- *All values throughout this document, as well as potential GHGI targets and compliance paths, use modeled values, which may differ from eventual metered results.*
- *Equipment efficiencies:*
    - *DHW: electric tank (0.82 EF), natural gas tank (0.67 EF), natural gas tankless (0.95 EF), ASHP integrated tank (1.90 EF)*
    - *Space Heating: natural gas furnace (95% AFUE), electric baseboard, Cold Climate ASHP for CZs 6-8 (COPs from NRCan calculator based on NEEP data) with back up heat same as base case if needed, regular heat pump for CZs 4 and 5 (HSPF 7.1/SEER 14.5) with back up heat same as base case if needed*
- *Financial incentives were not included in this analysis as they change frequently*

Approach

Three levels of target

The GHG Targets are set as follows:

- Medium: The larger of either heating or DHW must use a low-carbon fuel.
- Low: Allows for smaller end uses such as cooking or gas dryers to use high-carbon fuel, or allows use of a small portion of high carbon fuel for large end uses (e.g. backup heating) but requires low-carbon fuel for most end-uses.
- Zero-Carbon Ready: All energy end-uses on a low-carbon fuel.

Building Size

Building size is accounted for by setting an absolute base allowance and a maximum cap per unit for all buildings, then scaling the GHG targets linearly by size of dwelling between the base allowance and maximum cap for each level. The unit base allowance was set for 200 m^2 dwelling unit, the maximum cap based on a 400 m^2 dwelling unit.

The targets would be scaled by number of dwelling units in the building; e.g. a 4-plex would have four times the base per-unit allowance.

Climate Zone

All Climate Zones use the same targets without scaling.

Prescriptive Option

A potential prescriptive option is considered to act as a backstop target for compliance, but is less flexible.

Modelling Guidelines Required

Modelling guidelines may be required to ensure alignment between projects, including:

- GHG emission factors.
- Modelling auxiliary loads such as cooking loads, fireplaces, dryers, etc. using the appropriate fuels.
- Modelling backup heating appropriately.
- Modelling or excluding exterior loads such as pools, fireplaces, or BBQs.

Reasoning

Target levels

- Each GHG Step is set at a level which drives a technology or design choice towards lower carbon fuels.
- Targets are set using current Step 3 MEUI and TEDI targets, as well as an additional allowance for plug loads, lighting, and other base electric loads.
    - This means each GHGI target is designed to be realistic for a Step 3 home to achieve when it decarbonizes one or more systems such as domestic hot water or heating.
    - This also means that each GHGI target should, in theory, be even easier to achieve if a home meets Steps 4 or 5.

Building Size

- The base allowance per unit allows for fixed loads, such as domestic hot water or plug loads, that do not depend on the size of the dwelling. Assists modelling, design and construction of small, affordable housing units, while having minimal GHG impacts.
- The maximum cap per unit reflects that it is easier to achieve GHGI reductions in larger buildings.
- The GHGI variation between the minimum and maximum targets is used to drive efficient low-carbon building and mechanical design.

Climate Zone

- Using the same targets for all climates reduces complexity.
- Targets appear to be achievable in all Climate Zones for all archetypes.
- The use of fuel switching causes significant reductions regardless of loads. Break points remain between the target levels that generally encourage decarbonization at the appropriate levels.

- However, this can make more stringent targets in colder climate zones more challenging and introduce cost differentials.

Prescriptive option

- The prescriptive target levels are aligned with the intent of how each modeled target was set. The Medium target proposes to require heating to be decarbonized regardless of whether heating or domestic hot water would be more impactful for a particular building. Heating would be more impactful for buildings with higher absolute GHG use, in particular larger homes as well as those in colder climates. Therefore, for the backstop prescriptive target, the larger total impact measure across all dwellings is proposed as the requirement.

Proposed Targets

	All Buildings:		**The smaller of GHG intensity or the maximum absolute cap, for the unit size.**			**Prescriptive option (under consideration)**
	GHG Base Allowance per unit		**Building GHG Intensity**	**GHG Maximum Cap per unit**		
	kg CO2e per unit	OR	kgCO2e/m2/year	kg CO2e per unit	OR	
Medium	1050		6	2400		Decarbonize heating.
Low	440		2.5	800		Only backup heating or auxiliary uses (cooking, fireplaces, etc.) are allowed to use high carbon fuel.
Zero Carbon Ready	265		1.5	500		Project is fully decarbonized.

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Renewable Natural Gas Analysis

Using renewable natural gas (RG or RNG) can lower the carbon emissions of a building compared to conventional natural gas. This document includes an analysis illustrating the potential blend of renewable gas (RG or RNG) required to achieve the same stepped GHGI targets if all-gas equipment were used.

The use of RNG to meet the GHGI thresholds would only be available if the RNG were purchased in such a way that the building would permanently use low-carbon fuels regardless of change in owner or ratepayer. The annual modelled utility cost of RNG assumes an unlimited supply and is based on rates accurate at the time of writing.

The archetype examples focus primarily on electrification decarbonization measures because the energy and cost implications for these measures are more complex and require significant analysis to understand.

Renewable natural gas (RNG) decarbonization measures are much simpler from an analysis perspective:

- Use of RNG does not require changes to natural gas baseline equipment and therefore do not incur incremental capital costs.
- Utility cost of RNG in our analysis ends up cost neutral with natural gas once escalating carbon taxes over a 20-year period are accounted for (see assumptions above for more detail.)
- Thus, RNG becomes a simple 1:1 substitution for the modeled base case, which is typically natural gas.
- Therefore, what blend of RNG, as a percentage of total natural gas, would be sufficient to meet GHG targets?

The percentage of RNG required to meet targets is shown as a range because it will depend on the size of the dwelling (50 m^2 to 225 m^2 is shown below), with smaller homes requiring less RNG to meet targets. The percentage required will also vary with project specifics and design, for example a design that reduces natural gas heating loads would require a lower percentage of RNG. the below should be considered as a non-exhaustive example only. The below uses Step 3 as a base case.

Climate Zone	% RNG to meet Medium GHG Target	% RNG to meet Low GHG Target	% RNG to meet Zero Carbon Ready GHG Target
4	15% - 50%	70% - 80%	85% - 90%
5	20% - 80%	60% - 90%	70% - 90%
6	30% - 80%	65% - 90%	75% - 95%
7a	35% - 70%	75% - 90%	90% - 95%
7b	45% - 75%	80% - 90%	90% - 95%
8	50% - 80%	80% - 90%	90% - 95%

Example of archetypes

The tables below contain examples of modeled greenhouse gas emissions for a particular archetype, location, and set of design measures. The “base case” within the table uses a high-carbon fuel and varied initial Step level design measures (envelope, heat recovery) to set an initial baseline prior to decarbonization. Decarbonization measures are then applied to heating and domestic hot water, separately and in combination. This is not an exhaustive list of options to meet targets but is meant to demonstrate a few example points, with key metrics including incremental capital cost, utility cost, and the GHG target level achieved. It should be noted that drainwater heat recovery has been excluded from all options for consistency and comparability of results between different Steps but could certainly be applied on projects to reduce domestic hot water load and associated GHGs. In some cases, slightly different measures are provided at different Step levels due to available modelling runs from the Metrics Research Report modelling done.

Levels achieved are determined based on the allowance, GHGI, and maximum cap. Prescriptive compliance paths have yet to be fully developed and are not noted.

Some key points:

Targets Achieved

- Each archetype in each Climate Zone shows at least one fully decarbonized, Zero Carbon Ready option.
- Each archetype shows at least one mid-range option, which will typically comply with the Medium target.
- Not all decarbonization measures have the same impact for each archetype and Climate Zone. Decarbonizing only the smaller of the two end uses may not be sufficient. In many cases the higher impact of space heating or hot water will need to be decarbonized to meet targets.
- Most archetypes below achieve either no target, Medium, or Zero Carbon Ready. Only a few achieve the Low target. This is because the Low target is set to still require major systems to be decarbonized, but to allow some buffer for smaller end uses such as cooking, gas dryers, or some amount of backup heating. The archetypes modeled use electricity for these end uses by default and use cold climate heat pumps in Climate Zones 6 and above.

Carbon reduction impacts

A few examples of the amount of carbon reduction are below:

- Laneway home in Vancouver: **89% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Large single family dwelling in Summerland: **95% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Quadplex in Fort St. John: **93% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Medium single family dwelling in Cranbrook: **70% reduction** from Step 3 base case to Step 3 Middle target.
- 10-unit MURB in Fort Nelson: **76% reduction** from Step 3 base case to Step 3 Middle target.

Cost Impacts

- Maximum incremental capital cost for any of the below examples in all Climate Zones, including zero-carbon ready targets, is 3.4%. Typical incremental capital cost for most archetypes is lower, generally below 1.5%.
- Utility costs typically range from approximately 30% savings to 30% increase in costs related to decarbonization. Climate Zones 7b and 8 show larger increases, ranging up to 60%. There is not a linear relationship between decarbonization and utility costs; with efficiency improvements as well as increasing carbon taxes there are a range of utility cost outcomes shown.
- Utility cost impacts tend to show:
    - Greatest increase when employing electric resistance space heating (which is less efficient than a heat pump)
    - Greatest decrease when using heat pumps for both space heating and hot water

Electric Resistance Heating

In general, heat pumps are used as a decarbonization measure for both heating and domestic hot water. There are a few examples that demonstrate the difference between electric resistance systems (such as electric baseboard) and heat pump for space heating. While these are somewhat less efficient, they generally can be applied as a decarbonization measure. They would typically have lower incremental cost and higher energy cost, and similar but slightly poorer GHG outcomes. The difference in GHG outcomes is likely to be negligible to most projects and electric resistance could be applied; in particular cases where a design is right at the edge of a target it may not be useable. The same principles apply to using electric resistance for DHW.

Low Target and Backup Heating

The “low” target is intended to allow for some backup or auxiliary high-carbon fuel use but for all major systems to be decarbonized. The modelling done for the Metrics Research Report Update used the low-carbon default fuels for auxiliary uses such as cooking, dryers, etc. Heat pumps modeled for the archetype buildings are cold climate air source heat pumps in Climate Zones 6 and above, and use electric resistance backup/supplemental heating where required.

The amount of backup high-carbon fuel allowed for (with the rest of the building fully decarbonized) is equivalent to approximately:

- For a large single family dwelling in Fort St. John (Climate Zone 7a)
    - 12% of Step 3 total annual heating load
    - 15% of Step 5 total annual heating load
- For a quadplex in Fort St. John (Climate Zone 7a)
    - 30% of a Step 4 total annual heating load
- For a large single family dwelling in Uranium City (Climate Zone 8)
    - Only allows for 3% of Step 3 total annual heating load.
    - These projects would likely use the prescriptive option to meet targets. Compliance is also possible if the project fully decarbonizes and does not use high-carbon backup fuel.

Laneway data tables: Climate Zone 4 (Vancouver)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/ yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/ yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/ yr		440 kgCO₂e/ yr	265 kgCO₂e/ yr	
		A	B		A	B		A	B		A	B		A	B			
Space heating equipment																		
Gas furnace	●		●	None modeled			All options meet targets	●		●			All options meet targets	●		None modeled		
Electric baseboard		●				●			●			●						
Air-source heat pump					●						●				●		●	
Water heating equipment																		
Tankless gas heater 95%	●	●						●	●					●	●			
Electric resistance			●			●				●		●						
ASHP					●						●						●	
Cost and performance data																		
Annual modelled GHG	1100	791	577		116	137		991	785	440	113	131		919	785		115	
Annual modelled GHGI	15.8	11.3	8.3		1.7	1.9		14.2	11.3	6.3	1.7	1.9		13.2	11.3		1.7	
Annual modelled utility cost ($/m²)	13.5	14.5	13.6		13.6	16.7		13.3	14	13.3	13.4	16.3		13.3	14		13.5	
Annual modelled utility cost increase vs. base case (%)	0%	7%	1%		1%	24%		0%	5%	0%	1%	23%		0%	5%		1.5%	
Total ICC vs. base case ($/m²)	0	0	11.1		56.1	0		0	0	11.1	45.0	0.0		0	44.3		56.1	
% ICC vs base case	0%	0%	0.3%		2.0%	0%		0%	0%	0.4%	2.0%	0.0%		0%	1.5%		1.9%	

Laneway data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/ yr		440 kgCO₂e/yr	265 kgCO₂e/ yr	
				A	B		A	B		A		A	B		A	B
Space heating equipment																
Gas furnace	●		None modeled			●		●	None modeled		All options meet targets	●				
Electric baseboard		●		●			●						●		●	
Air-source heat pump					●					●						●
Water heating equipment																
Tankless gas heater 95%	●	●				●	●					●	●			
Electric resistance				●											●	
ASHP					●			●		●						●
Cost and performance data																
Annual modelled GHG	1204	801		146	130	1156	792	491		126		952	793		132	123
Annual modelled GHGI	17.3	11.5		2.1	1.9	16.6	11.4	7		1.8		13.7	11.4		1.9	1.8
Annual modelled utility cost ($/m²)	14.1	15.4		17.5	14.9	13.6	14.6	Not calculated		14.5		13.3	14.7		16.8	14.3
Annual modelled utility cost increase vs. base case (%)	0%	9%		24%	6%	0	7%	Not calculated		7%		0%	11%		26.3%	7.5%
Total ICC vs. base case ($/m²)	0	0		0.0	60.2	0	9.2	57.5		69.9		0.0	48.9		0.0	60.8
% ICC vs base case	0%	0%		0.0%	1.9%	0	0%	1.9%		2.3%		0.0%	1.6%		0.0%	2.0%

Laneway data tables: Climate Zone 6 (Cranbrook)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready			None	Medium	Low	Zero Carbon Ready		
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/ yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/y r	440 kgCO₂e/ yr	265 kgCO₂e/yr			>1050 kgCO₂/yr	1050 kgCO₂e/ yr	440 kgCO₂e/ yr	265 kgCO₂e/ yr		
		A	B		A	B				A	B					A	B	
Space heating equipment																		
Gas furnace	●		●	None modeled			●		None modeled				●		None modeled			
Electric baseboard						●		●			●			●				●
Air-source heat pump		●			●					●						●		
Water heating equipment																		
Tankless gas heater 95%	●	●					●	●					●	●				
Electric resistance						●					●							●
ASHP			●		●					●						●		
Cost and performance data																		
Annual modelled GHG	1479	835	773		129	161	1269	840		128	149		1091	830		124	139	
Annual modelled GHGI	21.2	12	11.1		1.9	2.3	17.9	12.1		1.8	2.1		15.6	11.9		1.8	2	
Annual modelled utility cost ($/m²)	Not Calculated	15	Not Calculated		14.8	18	14.2	15.4		14.7	17.8		14.2	14.6		14.3	17.8	
Annual modelled utility cost increase vs. base case (%)	0%	Not Calculated	Not Calculated		Not Calculated	Not Calculated	0%	8%		3.5%	25.4%		0%	3%		0.7%	25.4%	
Total ICC vs. base case ($/m²)	0	38.2	12.4		50.7	-8.6	0	0		63.1	0.0		0	51.8		64.2	0.0	
% ICC vs base case	0%	1.2%	0.4%		1.6%	-0.3%	0%	0%		2.0%	0.0%		0%	3.0%		3.4%	1.4%	

Laneway data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
				A	B								
Space heating equipment													
Gas furnace	●		None modeled			●		None modeled		●		None modeled	
Electric baseboard		●		●	●				●		●		●
Air-source heat pump							●						
Water heating equipment													
Tankless gas heater 95%	●	●				●	●			●	●		
Electric resistance					●								●
ASHP				●					●				
Cost and performance data													
Annual modelled GHG	1811	941		168	175	1565	921		159	1528	920		164
Annual modelled GHGI	26	13.5		2.4	2.5	22.4	13.2		2.3	21.9	13.2		2.4
Annual modelled utility cost ($/m²)	15.1	17.6		18.4	20.1	Not calculated	15.8		17.5	15.6	15.7		20.9
Annual modelled utility cost increase vs. base case (%)	0	17%		21.9%	33.1%	0%	Not calculated		Not calculated	0%	1%		34.0%
Total ICC vs. base case ($/m²)	0	12.5		28.8	0.0	0	71.0		20.1	0	70.7		0.0
% ICC vs base case	0%	0%		0.70%	0.0%	0%	2%		0.6%	0%	1.7%		0.0%

Laneway data tables: Climate Zone 7b (Fort Nelson)

	Step 3						Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
	A	B			A	B				A	B				
Space heating equipment															
Gas furnace	●	●		None modeled			●		None modeled			●		None modeled	
Electric baseboard			●		●					●					●
Air-source heat pump						●		●			●		●		
Water heating equipment															
Tankless gas heater 95%	●		●				●	●				●	●		
Electric resistance										●					●
ASHP		●			●	●					●				
Cost and performance data															
Annual modelled GHG	2137	1318	980		188	160	1986	958		190	158	1733	949		175
Annual modelled GHGI	30.7	18.9	14.1		2.7	2.3	28.5	13.7		2.7	2.3	24.9	13.6		2.5
Annual modelled utility cost ($/m²)	Not calculated	Not calculated	19.4		20.2	17.7	16.3	17.4		21.8	17.5	16.2	16.6		22.2
Annual modelled utility cost increase vs. base case (%)	0	19.4	Not calculated		Not calculated	Not calculated	0%	Not calculated		Not calculated	Not calculated	0%	2%		37.0%
Total ICC vs. base case ($/m²)	0	16.6	0		16.6	84.2	0	71.9		0.0	88.5	0	71.9		0.0
% ICC vs base case	0%	0.4%	0%		0.4%	2.0%	0%	1.7%		0.0%	2.1%	0%	1.7%		0.0%

Laneway data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4				Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 70m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr		>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/ yr	
				A	B								A	B
Space heating equipment														
Gas furnace	●		None modeled			●		None modeled		●		None modeled		
Electric baseboard		●		●	●									●
Air-source heat pump							●		●		●		●	
Water heating equipment														
Tankless gas heater 95%	●	●				●	●			●	●			
Electric resistance					●									●
ASHP				●					●				●	
Cost and performance data														
Annual modelled GHG	2724	1026		221	227	2227	987		173	1950	976		163	187
Annual modelled GHGI	39.1	14.7		3.2	3.3	31.9	14.2		2.5	28	14		2.3	2.7
Annual modelled utility cost ($/m²)	17.8	22.2		23.2	24.6	17.1	18.6		18.9	16.3	17.6		17.9	23.7
Annual modelled utility cost increase vs. base case (%)	0	24.7%		30.3%	38.2%	0	8.8%		10.5%	0%	8%		9.8%	45.4%
Total ICC vs. base case ($/m²)	0	0.0		16.6	0.0	0	80		97.1	0	71.9		88.5	0.0
% ICC vs base case	0%	0.0%		0.4%	0.0%	0%	2%		2.2%	0%	1.7%		2.1%	0.0%

Small Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	**None**	**Medium**		**Low**	**Zero Carbon Ready**	**None**	**Medium**		**Low**	**Zero Carbon Ready**	**None**	**Medium**		**Low**	**Zero Carbon Ready**
GHG Target (based on 102m² unit size)	**>1050 kgCO₂/yr**	**1050 kgCO₂e/yr**		**440 kgCO₂e/yr**	**265 kgCO₂e/yr**	**>1050 kgCO₂/yr**	**1050 kgCO₂e/yr**		**440 kgCO₂e/yr**	**265 kgCO₂e/yr**	**>1050 kgCO₂/yr**	**1050 kgCO₂e/yr**		**440 kgCO₂e/yr**	**265 kgCO₂e/yr**
		A	B				A	B				A	B		
Space heating equipment															
Gas furnace	●	●		None modeled		●		●	None modeled		All modeled options meet	●		None modeled	
Electric baseboard															
Air-source heat pump			●		●		●			●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●	●					●	●		
Electric resistance															
ASHP		●			●			●		●					●
Cost and performance data															
Annual modelled GHG	1278	809	794		126	1095	799	595		129		972	796		125
Annual modelled GHGI	12.5	7.9	7.8		1.2	10.7	7.8	5.8		1.3		9.5	7.8		1.2
Annual modelled utility cost ($/m²)	9.4	10.3	10.1		9.9	9.3	10.4	10.2		10.1		9.5	10.2		9.9
Annual modelled utility cost increase vs. base case (%)	0	9.6%	7%		5.3%	0.0%	11.8%	9.7%		8.6%		0.0%	7.4%		4.2%
Total ICC vs. base case ($/m²)	0	7.6	30.8		38.4	0.0	30.8	7.6		38.4		0.0	30.8		38.4
% ICC vs base case	0%	0.4%	1.4%		0.6%	0%	1.4%	0.3%		0.6%		0.0%	1.4%		1.7%

Small Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3				Step 4					Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 102m² unit size)	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr		440 kgCO₂e/yr	265 kgCO₂e/yr
						A	B				A	B		
Space heating equipment														
Gas furnace	●	●	None modeled		●		●	None modeled		●		●	None modeled	
Electric baseboard														
Air-source heat pump				●		●			●		●			●
Water heating equipment														
Tankless gas heater 95%	●				●	●				●				
Electric resistance														
ASHP		●		●			●		●		●	●		●
Cost and performance data														
Annual modelled GHG	1385	921		145	1222	808	744		139	1104	806	602		137
Annual modelled GHGI	13.6	9		1.4	12	7.9	7.3		1.4	10.8	7.9	5.9		1.3
Annual modelled utility cost ($/m²)	9.7	10.6		11.1	9.5	10.9	10.4		10.8	9.4	10.8	10.2		10.6
Annual modelled utility cost increase vs. base case (%)	0	9.3%		14.4%	0	14.7%	9.5%		13.7%	0.0%	14.9%	8.5%		12.8%
Total ICC vs. base case ($/m²)	0	8.1		41.2	0	33.1	8.1		41.2	0.0	33.1	8.1		41.2
% ICC vs base case	0%	0.3%		1.7%	0%	1%	0%		1.8%	0.0%	1.4%	0.3%		1.7%

Small Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m² unit size)	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
	A	B											
Space heating equipment													
Gas furnace	●	●		None modeled		●	●	None modeled		●	●	None modeled	
Electric baseboard			None modeled										
Air-source heat pump					●				●				●
Water heating equipment													
Tankless gas heater 95%	●					●				●			
Electric resistance													
ASHP		●			●		●		●		●		●
Cost and performance data													
Annual modelled GHG	1642	1189			147	1411	936		142	1340	855		138
Annual modelled GHGI	16.1	11.6			1.4	13.8	9.2		1.4	13.1	8.4		1.4
Annual modelled utility cost ($/m²)	10	11			11.2	9.7	10.7		10.9	9.6	10.6		10.7
Annual modelled utility cost increase vs. base case (%)	0	10.0%			12.0%	0	10.3%		12.4%	0.0%	10.4%		11.5%
Total ICC vs. base case ($/m²)	0	8.5			43.2	0	8.5		43.2	0.0	8.5		43.2
% ICC vs base case	0%	0.3%			1.7%	0%	0%		1.8%	0.0%	0.3%		1.7%

Small Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m² unit size)	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
	A	B											
Space heating equipment													
Gas furnace	●	●		None modeled		●	●	None modeled		●		None modeled	
Electric baseboard													
Air-source heat pump			●		●				●		●		●
Water heating equipment													
Tankless gas heater 95%	●		●			●				●	●		
Electric resistance													
ASHP		●			●		●		●				●
Cost and performance data													
Annual modelled GHG	2124	1677	896		161	1939	936		158	1882	932		154
Annual modelled GHGI	20.8	16.4	8.8		1.6	19	9.2		1.5	18.4	9.1		1.5
Annual modelled utility cost ($/m²)	10.6	11.7	Not calculated		12.1	11.1	11.7		11.9	11	11.4		11.6
Annual modelled utility cost increase vs. base case (%)	0	10.4%	Not calculated		14.2%	0	5.4%		7.2%	0.0%	3.6%		5.5%
Total ICC vs. base case ($/m²)	0	11.4	47.0		58.4	0	49.1		60.4	0.0	49.5		61.3
% ICC vs base case	0%	0%	1.4%		1.8%	0%	1.5%		1.8%	0.0%	1.4%		1.8%

Small Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m² unit size)	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		No simulated options meet Step 5			
Electric baseboard														
Air-source heat pump			●		●			●		●				
Water heating equipment														
Tankless gas heater 95%	●		●			●		●						
Electric resistance														
ASHP		●			●		●			●				
Cost and performance data														
Annual modelled GHG	2573	2138	1004		191	2258	1817	975		179				
Annual modelled GHGI	25.2	20.9	9.8		1.9	22.1	17.8	9.5		1.8				
Annual modelled utility cost ($/m²)	11.1	12.3	Not calculated		14	10.7	11.9	12.9		13.2				
Annual modelled utility cost increase vs. base case (%)	0	10.8%	Not calculated		26.1%	0	11.2%	20.6%		23.4%				
Total ICC vs. base case ($/m²)	0	11.4	46.3		57.7	0	11.4	46.3		57.7				
% ICC vs base case	0%	0%	1.4%		1.8%	0%	0%	1.4%		1.7%				

Small Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m² unit size)	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr		1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr	>1050 kgCO₂/yr	1050 kgCO₂e/yr	440 kgCO₂e/yr	265 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		No simulated options meet Step 5			
Electric baseboard														
Air-source heat pump			●		●			●		●				
Water heating equipment														
Tankless gas heater 95%	●		●			●		●						
Electric resistance														
ASHP		●			●		●			●				
Cost and performance data														
Annual modelled GHG	2887	2480	1037		207	2394	1955	996		188				
Annual modelled GHGI	28.2	24.3	10.1		2	23.4	19.1	9.7		1.8				
Annual modelled utility cost ($/m²)	11.4	12.7	Not calculated		15	10.9	12.1	13.3		13.8				
Annual modelled utility cost increase vs. base case (%)	0	11.4%	Not calculated		31.6%	0	11.0%	22.0%		26.6%				
Total ICC vs. base case ($/m²)	0	11.4	46.3		57.6	0	11.4	46.3		57.7				
% ICC vs base case	0%	0%	1.4%		1.8%	0%	0%	1.4%		1.7%				

Medium Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr		592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr		592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B					A	B				A	B		
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		All modeled options meet	●		None modeled	
Electric baseboard															
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●				●	●		
Electric resistance															
ASHP		●			●		●			●					●
Cost and performance data															
Annual modelled GHG	2119	1631	803		138	1712	1206	800		134		1374	793		127
Annual modelled GHGI	8.9	6.9	3.4		0.6	7.2	5.1	3.4		0.6		5.8	3.3		0.5
Annual modelled utility cost ($/m²)	4.5	4.9	4.6		4.6	4.4	4.8	4.5		4.5		Not calculated	4.3		4.3
Annual modelled utility cost increase vs. base case (%)	0	8.9%	2.2%		2.2%	0	9.1%	2.3%		2.3%		0%	Not calculated		Not calculated
Total ICC vs. base case ($/m²)	0	1.4	10.0		13.2	0	2.3	11		2.3		0.0	13.2		16.3
% ICC vs base case	0%	0.1%	0.4%		0.6%	0%	0.1%	1%		0.6%		0.0%	0.6%		0.8%

Medium Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		●		None modeled	
Electric baseboard														
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	2372	1884	822		156	1958	1463	816		150	1611	807		141
Annual modelled GHGI	10	8	3.5		0.7	8.3	6.2	3.4		0.6	6.8	3.4		0.6
Annual modelled utility cost ($/m²)	4.6	5	5.1		5.1	4.5	4.9	4.9		4.9	4.4	4.7		4.7
Annual modelled utility cost increase vs. base case (%)	0	8.7%	10.9%		10.9%	0	8.9%	8.9%		8.9%	0%	6.8%		6.8%
Total ICC vs. base case ($/m²)	0	3.5	14.3		17.8	0	3.5	14		17.8	0	14.4		18.0
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0.2%	0.6%		0.8%	0%	0.6%		0.7%

Medium Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		●		None modeled	
Electric baseboard														
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	2958	2479	873		170	2395	1904	858		154	1852	849		146
Annual modelled GHGI	12.5	10.5	3.7		0.7	10.1	8	3.6		0.7	7.8	3.6		0.6
Annual modelled utility cost ($/m²)	5	5.4	5.4		5.5	4.6	5.1	5		5	4.7	4.8		4.8
Annual modelled utility cost increase vs. base case (%)	0	8.0%	8.0%		10.0%	0	10.9%	8.7%		8.7%	0%	2.1%		2.1%
Total ICC vs. base case ($/m²)	0	3.8	15.0		18.6	0	3.7	15		18.6	0	15.3		19.0
% ICC vs base case	0%	0.1%	0.6%		0.7%	0%	0.2%	0.6%		0.8%	0%	0.7%		0.8%

Medium Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		●		None modeled	
Electric baseboard														
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	3567	3078	687		197	3005	2505	962		185	2583	951		174
Annual modelled GHGI	15.1	13	2.9		0.8	12.7	10.6	4.1		0.8	10.9	4		0.7
Annual modelled utility cost ($/m²)	5.2	5.7	Not calculated		6.2	5.2	5.5	5.7		5.9	5	5.4		5.6
Annual modelled utility cost increase vs. base case (%)	0	9.6%	Not calculated		19.2%	0	5.8%	9.6%		13.5%	0%	8.0%		12.0%
Total ICC vs. base case ($/m²)	0	4.7	19.7		24.4	0	6.1	21		26.0	0	20.8		25.7
% ICC vs base case	0%	0.1%	0.6%		0.7%	0%	0.1%	0.6%		0.7%	0%	0.6%		0.7%

Medium Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr	1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B											
Space heating equipment													
Gas furnace	●	●		None modeled		●		None modeled		●		None modeled	
Electric baseboard													
Air-source heat pump			●		●		●		●		●		●
Water heating equipment													
Tankless gas heater 95%	●		●			●	●			●	●		
Electric resistance													
ASHP		●			●				●				●
Cost and performance data													
Annual modelled GHG	4592	4119	1039		245	3787	1015		222	3169	995		201
Annual modelled GHGI	19.4	17.4	4.4		1	16	4.3		0.9	13.4	4.2		0.8
Annual modelled utility cost ($/m²)	5.8	6.3	7.3		7.5	5.5	6.7		6.9	5.2	6.1		6.3
Annual modelled utility cost increase vs. base case (%)	0	8.6%	25.9%		29.3%	0	21.8%		25.5%	0%	17.3%		21.2%
Total ICC vs. base case ($/m²)	0	4.9	20.0		24.9	0	21		26.1	0	21.2		26.1
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0.6%		0.8%	0%	0.6%		0.8%

Medium Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 237m² unit size)	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr	>1422 kgCO₂/yr		1422 kgCO₂e/yr	592 kgCO₂e/yr	355 kgCO₂e/yr
	A	B	A		A	A	B								
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		●			None modeled	
Electric baseboard															
Air-source heat pump			●		●			●		●		●			●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●	●			
Electric resistance															
ASHP		●			●		●			●					●
Cost and performance data															
Annual modelled GHG	4929	4482	1085		278	4126	3671	1058		251	3499	1035			227
Annual modelled GHGI	20.8	18.9	4.6		1.2	17.4	15.5	4.5		1.1	14.8	4.4			1
Annual modelled utility cost ($/m²)	6	6.5	8.1		8.4	5.6	6.1	7.4		7.6	5.4	6.8			7
Annual modelled utility cost increase vs. base case (%)	0	8.3%	35.0%		40.0%	0	8.9%	32.1%		35.7%	0%	25.9%			29.6%
Total ICC vs. base case ($/m²)	0	4.9	20.0		24.9	0	4.9	20.0		24.9	0	21.2			26.1
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0%	0.6%		0.8%	0%	0.7%			0.8%

Large Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr	2400 kgCO₂e/yr		800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B	A		A	A	B					A	B		
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		●	●			
Electric baseboard															
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	3637	3156	838		172	2906	2413	823		157	2442	1898	812		146
Annual modelled GHGI	7.1	6.2	1.6		0.3	5.7	4.7	1.6		0.3	4.8	3.7	1.6		0.3
Annual modelled utility cost ($/m²)	2.5	2.7	2.6		2.6	2.3	2.5	2.4		2.4	2.3	2.4	2.2		2.2
Annual modelled utility cost increase vs. base case (%)	0	8.0%	4%		4.0%	0	8.7%	4.3%		4.3%	0%	4.3%	-4.3%		-4.3%
Total ICC vs. base case ($/m²)	0	1.5	6.2		7.7	0	1.5	6		7.7	0	1.5	6.2		7.7
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0%	0.2%		0.3%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr	2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●				●	●				●	●		
Electric baseboard				None modeled					None modeled				None modeled	
Air-source heat pump			●		●			●		●				●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●			
Electric resistance														
ASHP		●			●		●			●		●		●
Cost and performance data														
Annual modelled GHG	4288	3815	876		208	3214	2731	850		185	2849	2356		176
Annual modelled GHGI	8.4	7.5	1.7		0.4	6.3	5.3	1.7		0.4	5.6	4.6		0.3
Annual modelled utility cost ($/m²)	2.6	2.8	3		3	2.4	2.6	2.7		2.7	2.3	2.5		2.6
Annual modelled utility cost increase vs. base case (%)	0	7.7%	15%		15.4%	0	8.3%	12.5%		12.5%	0%	8.7%		13.0%
Total ICC vs. base case ($/m²)	0	1.6	6.6		8.2	0	1.6	7		8.2	0	1.6		8.2
% ICC vs base case	0%	0.1%	0.3%		0.3%	0%	0.1%	0.3%		0.4%	0%	0.0%		0.3%

Large Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B				A	B	B		A	A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	5453	5001	925		223	4461	3988	909		206	3755	3280	890		188
Annual modelled GHGI	10.7	9.8	1.8		0.4	8.7	7.8	1.8		0.4	7.3	6.4	1.7		0.4
Annual modelled utility cost ($/m²)	2.9	3.1	3.2		3.2	2.7	2.9	3		3	2.5	2.7	2.7		2.8
Annual modelled utility cost increase vs. base case (%)	0	6.9%	10%		10.3%	0	7.4%	11.1%		11.1%	0%	8.0%	8.0%		12.0%
Total ICC vs. base case ($/m²)	0	1.7	6.9		8.6	0	1.7	7		8.6	0	1.7	6.9		8.6
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B				A	B				A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	7412	6961	1079		303	5975	5504	1044		268	5069	4600	1016		240
Annual modelled GHGI	14.5	13.6	2.1		0.6	11.7	10.8	2		0.5	9.9	9	2		0.5
Annual modelled utility cost ($/m²)	3.3	3.6	4.1		4.2	3	3.3	3.7		3.8	2.8	3	3.3		3.4
Annual modelled utility cost increase vs. base case (%)	0	9.1%	24.2%		27.3%	0	10.0%	23.3%		26.7%	0%	7%	17.9%		21.4%
Total ICC vs. base case ($/m²)	0	13.4	55.0		57.9	0	2.3	9.3		11.5	0	2.3	9.3		11.5
% ICC vs base case	0%	0.4%	1.7%		1.8%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B				A	B				A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled						
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	8629	8181	1164		371	6960	6513	1109		316	6754	6303	1102		309
Annual modelled GHGI	16.9	16	2.3		0.7	13.6	12.7	2.2		0.6	13.2	12.3	2.2		0.6
Annual modelled utility cost ($/m²)	3.6	3.9	4.9		5	3.2	3.5	4.3		4.4	3.2	3.4	4.2		4.3
Annual modelled utility cost increase vs. base case (%)	0	8.3%	36.1%		38.9%	0	9.4%	34.4%		37.5%	0%	6%	31.3%		34.4%
Total ICC vs. base case ($/m²)	0	2.3	9.3		11.5	0	2.3	9.3		11.5	0	2.3	9.3		11.5
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.0%	0.2%		0.3%	0%	0.1%	0.3%		0.3%

Large Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m² unit size)	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr	>2400 kgCO₂/yr		2400 kgCO₂e/yr	800 kgCO₂e/yr	500 kgCO₂e/yr
	A	B				A	B				A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	10686	10288	1282		477	8316	7900	1199		394	7244	6817	1307		357
Annual modelled GHGI	20.9	20.1	2.5		0.9	16.3	15.5	2.3		0.8	14.2	13.3	2.6		0.7
Annual modelled utility cost ($/m²)	4.1	4.4	6.2		6.4	3.6	3.8	5.2		5.3	3.3	3.6	Not calculated		4.9
Annual modelled utility cost increase vs. base case (%)	0	7.3%	51.2%		56.1%	0	5.6%	44.4%		47.2%	0%	9%	Not calculated		48.5%
Total ICC vs. base case ($/m²)	0	2.3	9.3		11.5	0	2.3	9.3		11.5	0	2.3	9.3		11.5
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%

Row Home data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium			Low	Zero Carbon Ready
GHG Target (based on 169m² unit size x 6 units = 1016m² total size)	>6300 kgCO₂/yr	6300 kgCO₂e/yr		2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr		2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr			2640 kgCO₂e/yr	1590 kgCO₂e/yr
		A	B				A	B		A		A	B	C		
Space heating equipment																
Gas furnace	●	●		None modeled		●	●		None modeled		All modeled options meet	●		●	None modeled	
Electric baseboard																
Air-source heat pump			●		●			●		●			●			●
Water heating equipment																
Tankless gas heater 95%	●		●			●		●				●	●			
Electric resistance																
ASHP		●			●		●			●				●		●
Cost and performance data																
Annual modelled GHG	8298	6195	4732		721	7075	4102	4699		682		5892	4676	2808		656
Annual modelled GHGI	8.8	6.1	4.7		0.7	7	4	4.6		0.7		5.8	4.6	2.8		0.6
Annual modelled utility cost ($/m²)	5.7	5.7	5.1		4.7	5.1	5.1	4.9		4.5		4.9	4.7	4.8		4.3
Annual modelled utility cost increase vs. base case (%)	0	0.0%	0.8%		-17.5%	0.0%	0.0%	-3.9%		-11.8%		0%	-4.1%	-2.0%		-12.2%
Total ICC vs. base case ($/m²)	0	0.8	3.1		3.3	0.0	0.7	3.1		3.8		0.0	1.5	-0.2		2.2
% ICC vs base case	0%	0.0%	0.1%		0.2%	0.0%	0.0%	0.1%		0.1%		0.0%	0.1%	0.0%		0.1%

Row Home data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 169m² unit size x 6 units = 1016m² total size)	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr		2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr		2640 kgCO₂e/yr	1590 kgCO₂e/yr
							A	B				A	B		
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		●		●	None modeled	
Electric baseboard															
Air-source heat pump			●		●			●		●		●			●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●	●			
Electric resistance															
ASHP		●			●		●			●			●		●
Cost and performance data															
Annual modelled GHG	10806	8064	4765		830	8690	5781	4781		769	6540	4733	3487		713
Annual modelled GHGI	10.6	7.9	4.7		0.8	8.6	5.7	4.7		0.8	6.4	4.7	3.4		0.7
Annual modelled utility cost ($/m²)	6.3	6.3	Not calculated		5.4	5.6	5.6	5.4		5	5.4	5.1	4.9		4.7
Annual modelled utility cost increase vs. base case (%)	0	0	Not calculated		-14.3%	0	0.0%	-3.6%		-10.7%	0%	-5.6%	-9.3%		-13.0%
Total ICC vs. base case ($/m²)	0	0.8	3.3		4.1	0	0.8	3.3		4.1	0.0	3.4	0.9		4.2
% ICC vs base case	0%	0%	0.1%		0.2%	0%	0.0%	0.1%		0.1%	0.0%	0.2%	0.1%		0.2%

Row Home data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 169m² unit size x 6 units = 1016m² total size)	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr		2640 kgCO₂e/yr	1590 kgCO₂e/yr
	A	B				A	B					A	B		
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		●	●		None modeled	
Electric baseboard															
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	13595	10919	5011		859	10418	7494	4986		792	7867	4839	4931		733
Annual modelled GHGI	13.4	10.7	4.9		0.8	10.3	7.4	4.9		0.8	7.7	4.8	4.9		0.7
Annual modelled utility cost ($/m²)	6.9	7	Not calculated		5.6	6.1	6.1	5.5		5.2	5.6	5.4	5.2		4.8
Annual modelled utility cost increase vs. base case (%)	0	1.4%	Not calculated		-18.8%	0	0	-9.8%		-14.8%	0%	-3.6%	-7.1%		-14.3%
Total ICC vs. base case ($/m²)	0	0.9	3.5		4.4	0	0.9	3.5		4.3	0	0.9	3.6		4.4
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.1%	0.2%		0.2%

Row Home data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 169m² unit size x 6 units = 1016m² total size)	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr
	A	B				A	B				A	B			
Space heating equipment															
Gas furnace	●	●		None modeled		●	●		None modeled		●	●		None modeled	
Electric baseboard															
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	17071	14252	5564		1030	13469	10594	5468		924	10619	7440	5378		831
Annual modelled GHGI	16.8	14	5.5		1	13.3	10.4	5.4		0.9	10.5	7.3	5.3		0.8
Annual modelled utility cost ($/m²)	8	8.1	Not calculated		6.7	7	7	6.3		6	6.1	6.1	5.8		5.4
Annual modelled utility cost increase vs. base case (%)	0	1.3%	Not calculated		-16.3%	0	0	-10.0%		-14.3%	0%	0.0%	-4.9%		-11.5%
Total ICC vs. base case ($/m²)	0	1.1	4.7		5.8	0	1.4	5.0		6.1	0	1.1	4.7		5.8
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.1%	0.2%		0.2%

Row Home data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 169m² unit size x 6 units = 1016m² total size)	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr		6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr	>6300 kgCO₂/yr	6300 kgCO₂e/yr	2640 kgCO₂e/yr	1590 kgCO₂e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●		None modeled		●	●		None modeled		●		None modeled	
Electric baseboard														
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	24335	21771	6089		1402	18179	15167	5877		1184	15460	5785		1089
Annual modelled GHGI	23.8	21.4	6		1.4	17.9	14.9	5.8		1.2	15.2	5.7		1.1
Annual modelled utility cost ($/m²)	9.9	10.1	9.2		9	8.2	8.3	7.9		7.6	7.5	7.3		7
Annual modelled utility cost increase vs. base case (%)	0	2.0%	-7.1%		-9.1%	0	1.2%	-3.7%		-7.3%	0%	-2.7%		-6.7%
Total ICC vs. base case ($/m²)	0	1.4	5.0		6.1	0	1.1	4.7		5.8	0.0	5.0		6.1
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.2%		0.2%

Quadplex data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr		>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr		>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	
				A	B				A	B				A	B
Space heating equipment															
Gas furnace	●		None modeled			●		None modeled			All modeled options meet	●	None modeled		
Electric baseboard				●					●					●	
Air-source heat pump		●			●		●			●		●			●
Water heating equipment															
Tankless gas heater 95%	●	●				●	●					●			
Electric resistance															
ASHP				●	●				●	●				●	●
Cost and performance data															
Annual modelled GHG	4886	3147		542	469	4250	3133		507	453		3818	3124	475	441
Annual modelled GHGI	10.9	7		1.2	1	9.4	7		1.1	1		8.5	6.9	1.1	1
Annual modelled utility cost ($/m²)	Not calculated	6.7		8.1	7.1	6.7	6.5		7.6	6.9		6.1	6.3	7.2	6.7
Annual modelled utility cost increase vs. base case (%)	0	Not calculated		Not calculated	Not calculated	0.0%	-3.0%		13.4%	3.0%		0%	3.3%	18.0%	9.8%
Total ICC vs. base case ($/m²)	0	14.2		-6.7	20.9	0.0	31.6		10.6	38.5		0.0	31.9	10.8	38.8
% ICC vs base case	0%	0.7%		-0.3%	1.0%	0.0%	1.4%		0.5%	1.8%		0.0%	1.4%	0.5%	1.7%

Quadplex data tables: Climate Zone 5 (Summerland)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready			None	Medium	Low	Zero Carbon Ready		
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂/yr	4200 kgCO₂e/yr		1760 kgCO₂e/yr	1060 kgCO₂e/yr		>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr			>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr		
		A	B		A	B				A	B					A	B	
Space heating equipment																		
Gas furnace	●			None modeled			●		None modeled				●		None modeled			
Electric baseboard		●			●					●						●		
Air-source heat pump			●			●		●			●			●				●
Water heating equipment																		
Tankless gas heater 95%	●	●	●				●	●					●	●				
Electric resistance																		
ASHP					●	●				●	●					●	●	
Cost and performance data																		
Annual modelled GHG	5526	3235	3199		585	519	4852	3179		542	500		4656	3170		531	490	
Annual modelled GHGI	12.3	7.2	7.1		1.3	1.2	10.8	7.1		1.2	1.1		10.3	7		1.2	1.1	
Annual modelled utility cost ($/m²)	6.7	7.9	7.4		8.7	7.8	6.5	7.1		8.2	7.6		6.4	7		8	7.4	
Annual modelled utility cost increase vs. base case (%)	0	17.9%	10.4%		29.9%	16.4%	0	9.2%		26.2%	16.9%		0%	9.4%		25.0%	15.6%	
Total ICC vs. base case ($/m²)	0	5.4	35.4		12.8	42.8	0	34.4		11.8	41.8		0.0	34.4		11.8	41.8	
% ICC vs base case	0%	0.1%	1.4%		0.5%	1.7%	0%	1.5%		0.5%	1.8%		0.0%	1.5%		0.5%	1.8%	

Quadplex data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4				Step 5			
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂/yr	4200 kgCO₂e/yr		1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr
		A	B										
Space heating equipment													
Gas furnace	●			None modeled		●		None modeled		●		None modeled	
Electric baseboard		●			●				●				●
Air-source heat pump			●				●				●		
Water heating equipment													
Tankless gas heater 95%	●	●	●			●	●			●	●		
Electric resistance													
ASHP					●				●				●
Cost and performance data													
Annual modelled GHG	6662	3417	3328		652	5618	3304		589	5334	3291		569
Annual modelled GHGI	14.8	7.6	7.4		1.4	12.5	7.3		1.3	11.8	7.3		1.3
Annual modelled utility cost ($/m²)	7	8.8	7.5		9.7	6.8	5.4		8.8	Not calculated	7		8.5
Annual modelled utility cost increase vs. base case (%)	0	25.7%	7.1%		38.6%	0	-20.6%		29.4%	0%	Not calculated		Not calculated
Total ICC vs. base case ($/m²)	0	4.7	36.2		4.7	0	36.2		12.4	0.0	34.6		10.9
% ICC vs base case	0%	0.2%	1.5%		0.2%	0%	1.4%		0.5%	0.0%	1.4%		0.4%

Quadplex data tables: Climate Zone 7a (Fort St. John)

	Step 3						Step 4				Step 5			
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂e/yr	4200 kgCO₂e/yr		1760 kgCO₂e/yr	1060 kgCO₂e/yr		>4200 kgCO₂e/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂e/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr
		A	B		A	B								
Space heating equipment														
Gas furnace	●			None modeled			●		None modeled		●		None modeled	
Electric baseboard		●			●									●
Air-source heat pump			●			●		●		●		●		
Water heating equipment														
Tankless gas heater 95%	●	●	●				●	●			●	●		
Electric resistance														
ASHP					●	●				●				●
Cost and performance data														
Annual modelled GHG	8839	3753	3637		753	604	7341	3604		571	6302	3570		536
Annual modelled GHGI	19.6	8.3	8.1		1.7	1.3	16.3	8		1.3	14	7.9		1.2
Annual modelled utility cost ($/m²)	7.5	10	8.4		11.1	9	7.2	7.9		8.6	7	7.5		8.1
Annual modelled utility cost increase vs. base case (%)	0	33.3%	12.0%		48.0%	20.0%	0	9.7%		19.4%	0%	7%		15.7%
Total ICC vs. base case ($/m²)	0	0.0	42.1		10.3	52.5	0	48.6		58.9	0.0	48.9		59.0
% ICC vs base case	0%	0.0%	1.3%		0.3%	1.6%	0%	1.5%		1.8%	0.0%	1.5%		1.8%

Quadplex data tables: Climate Zone 7b (Fort Nelson)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr
Space heating equipment												
Gas furnace	●		None modeled		●		None modeled		No simulated options meet Step 5.			
Electric baseboard												
Air-source heat pump		●		●		●		●				
Water heating equipment												
Tankless gas heater 95%	●	●			●	●						
Electric resistance												
ASHP				●				●				
Cost and performance data												
Annual modelled GHG	10740	3792		889	8756	3732		640				
Annual modelled GHGI	23.8	8.4		2	19.4	8.3		1.4				
Annual modelled utility cost ($/m²)	8.1	9.7		13.1	7.5	8.9		9.5				
Annual modelled utility cost increase vs. base case (%)	0	19.8%		61.7%	0	18.7%		26.7%				
Total ICC vs. base case ($/m²)	0	50.0		18.3	0	44.7		55.0				
% ICC vs base case	0%	1.5%		0.6%	0%	1.3%		1.6%				

Quadplex data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m² unit size x 4 units = 451m² total size)	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr		>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr	>4200 kgCO₂/yr	4200 kgCO₂e/yr	1760 kgCO₂e/yr	1060 kgCO₂e/yr
				A	B								
Space heating equipment													
Gas furnace	●		None modeled			●		None modeled		No simulated options meet Step 5.			
Electric baseboard				●									
Air-source heat pump		●			●		●		●				
Water heating equipment													
Tankless gas heater 95%	●	●				●	●						
Electric resistance													
ASHP				●	●				●				
Cost and performance data													
Annual modelled GHG	12002	3929		963	795	10237	3857		724				
Annual modelled GHGI	26.6	8.7		2.1	1.8	22.7	8.6		1.6				
Annual modelled utility cost ($/m²)	8.3	11		14.1	11.7	7.9	10		10.7				
Annual modelled utility cost increase vs. base case (%)	0	32.5%		69.9%	41.0%	0	26.6%		35.4%				
Total ICC vs. base case ($/m²)	0	44.7		13.0	55.0	0	44.7		55.0				
% ICC vs base case	0%	1.3%		0.4%	1.6%	0%	1.4%		1.7%				

10-unit MURB data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr
		A	B		A B		A	B		A B		A	B		A B
Space heating equipment															
Gas furnace	●			None modeled		●			None modeled		All modeled options meet targets	●		None modeled	
Electric baseboard		●			●		●			●					●
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●	●	●			●	●	●				●	●		
Electric resistance															
ASHP					● ●					● ●					● ●
Cost and performance data															
Annual modelled GHG	12995	5565	5291		1182 847	11472	5477	5258		1087 812		8157	5180		882 730
Annual modelled GHGI	7.9	3.4	3.2		0.7 0.5	6.9	3.3	3.2		0.7 0.5		4.9	4.9		0.5 0.4
Annual modelled utility cost ($/m²)	4.3	4.6	3.6		4.7 3.4	4	4.3	3.5		4.3 3.3		3.5	3.5		3.5 2.9
Annual modelled utility cost increase vs. base case (%)	0	7.0%	-16.3%		9.3% -20.9%	0.0%	7.5%	-12.5%		7.5% -17.5%		0.0%	0.0%		0.0% -17.1%
Total ICC vs. base case ($/m²)	0	0.0	19.0		4.7 23.7	0	0	19		4.7 23.7		0.0	19.0		4.7 23.7
% ICC vs base case	0%	0.0%	0.8%		0.2% 1.0%	0.0%	0.0%	0.8%		0.2% 1.0%		0.0%	0.7%		0.2% 0.9%

10-unit MURB data tables: Climate Zone 5 (Summerland)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂e/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr		>10500 kgCO₂e/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr		>10500 kgCO₂e/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas furnace	●			None modeled			●			None modeled			All modeled options meet targets	●		None modeled		
Electric baseboard		●			●			●			●						●	
Air-source heat pump			●			●			●			●			●			●
Water heating equipment																		
Tankless gas heater 95%	●	●	●				●	●	●					●	●			
Electric resistance																		
ASHP					●	●					●	●					●	●
Cost and performance data																		
Annual modelled GHG	16416	5759	5459		1369	1016	11710	5479	5338		1089	898		10188	5300		994	854
Annual modelled GHGI	9.9	3.5	3.3		0.8	0.6	7.1	3.3	3.2		0.7	0.5		6.2	3.2		0.6	0.5
Annual modelled utility cost ($/m²)	4.9	5.4	4		5.4	4	4	4.3	3.8		4.3	3.6		3.8	3.6		4	3.4
Annual modelled utility cost increase vs. base case (%)	0	10.2%	-18.4%		10.2%	-18.4%	0.0%	7.5%	-5.0%		7.5%	-10.0%		0.0%	-5.3%		5.3%	-10.5%
Total ICC vs. base case ($/m²)	0	2.1	22.5		7.1	27.5	0	0	21		5.3	25.7		0.0	20.7		5.3	25.7
% ICC vs base case	0%	0.0%	0.8%		0.2%	1.0%	0.0%	0.0%	0.8%		0.2%	1.0%		0.0%	0.8%		0.2%	1.0%

10-unit MURB data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr
		A	B		A B		A	B		A B		A	B		A B
Space heating equipment															
Gas furnace	●			None modeled		●			None modeled		●			None modeled	
Electric baseboard		●			●		●			●		●			●
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●	●	●			●	●	●			●	●	●		
Electric resistance															
ASHP					● ●					● ●					● ●
Cost and performance data															
Annual modelled GHG	20330	6167	5685		1591 1039	15943	5927	5613		1345 966	12781	5735	5527		1151 879
Annual modelled GHGI	12.3	3.7	3.4		1 0.6	9.6	3.6	3.4		0.8 0.6	7.7	3.5	3.3		0.7 0.5
Annual modelled utility cost ($/m²)	5.4	6.2	4.3		6.3 4.1	4.7	5.3	4.1		5.3 3.9	4.2	4.5	3.7		4.6 3.5
Annual modelled utility cost increase vs. base case (%)	0	14.8%	-20.4%		16.7% -24.1%	0	12.8%	-12.8%		12.8% -17.0%	0%	7.1%	-11.9%		9.5% -16.7%
Total ICC vs. base case ($/m²)	0	0.5	21.9		5.7 27.2	0	0	22		5.7 27.2	0	0.5	21.9		5.7 27.2
% ICC vs base case	0%	0.1%	0.8%		0.3% 1.0%	0%	0.0%	0.8%		0.2% 1.0%	0%	0.0%	218.5%		0.2% 0.9%

10-unit MURB data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr
		A	B		A B		A	B		A B		A	B		A B
Space heating equipment															
Gas furnace	●			None modeled		●			None modeled		●			None modeled	
Electric baseboard		●			▯		▯			▯		▯			▯
Air-source heat pump			▯		▯			▯		▯			▯		▯
Water heating equipment															
Tankless gas heater 95%	▯	▯	▯			▯	▯	▯			▯	▯	▯		
Electric resistance															
ASHP					▯ ▯					▯ ▯					▯ ▯
Cost and performance data															
Annual modelled GHG	23192	6734	6286		1774 1249	17924	6420	6121		1453 1082	16420	6334	6075		1365 1035
Annual modelled GHGI	14	4.1	3.8		1.1 0.8	10.8	3.9	3.7		0.9 0.7	9.9	3.8	3.7		0.8 0.6
Annual modelled utility cost ($/m²)	5.9	6.9	5.1		7 4.9	5	5.6	4.5		5.7 4.3	4.8	5.3	4.3		5.4 4.1
Annual modelled utility cost increase vs. base case (%)	0	16.9%	-13.6%		18.6% -16.9%	0	12.0%	-10.0%		14.0% -14.0%	0%	10.4%	-10.4%		12.5% -14.6%
Total ICC vs. base case ($/m²)	0	1.8	30.4		8.8 37.4	0	2	30		8.8 37.4	0	1.8	30.4		8.8 37.4
% ICC vs base case	0%	0.1%	0.8%		0.3% 1.0%	0%	0.0%	0.8%		0.2% 1.0%	0%	0.1%	0.8%		0.3% 1.0%

10-unit MURB data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr
		A	B		A B		A	B		A B		A	B		A B
Space heating equipment															
Gas furnace	●			None modeled		●			None modeled		●			None modeled	
Electric baseboard		●			▯		▯			▯		▯			▯
Air-source heat pump			▯		▯			▯		▯			▯		▯
Water heating equipment															
Tankless gas heater 95%	▯	▯	▯			▯	▯	▯			▯	▯	▯		
Electric resistance															
ASHP					▯ ▯					▯ ▯					▯ ▯
Cost and performance data															
Annual modelled GHG	27683	7074	6593		2010 1462	23075	6811	6441		1745 1308	20603	6669	6361		1603 1227
Annual modelled GHGI	16.7	4.3	4		1.2 0.9	13.9	4.1	3.9		1.1 0.8	12.4	4	3.8		1 0.7
Annual modelled utility cost ($/m²)	6.6	7.8	5.9		7.9 5.8	5.9	6.8	5.3		6.9 5.2	5.5	6.2	5		6.3 4.9
Annual modelled utility cost increase vs. base case (%)	0	18.2%	-10.6%		19.7% -12.1%	0	15.3%	-10.2%		16.9% -11.9%	0%	12.7%	-9.1%		14.5% -10.9%
Total ICC vs. base case ($/m²)	0	1.8	30.4		8.8 37.4	0	2	30		8.8 37.4	0	1.8	30.4		8.8 37.4
% ICC vs base case	0%	0.1%	0.8%		0.3% 1.0%	0%	0.1%	0.8%		0.3% 1.0%	0%	0.1%	0.8%		0.3% 1.0%

10-unit MURB data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 166m² unit size x 10 units = 1655m² total size)	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr	>10500 kgCO₂/yr	10500 kgCO₂e/yr		4400 kgCO₂e/yr	2650 kgCO₂e/yr
		A	B		A B		A	B		A B		A	B		A B
Space heating equipment															
Gas furnace	●			None modeled		●			None modeled		●			None modeled	
Electric baseboard		●			▯		▯			▯		▯			▯
Air-source heat pump			▯		▯			▯		▯			▯		▯
Water heating equipment															
Tankless gas heater 95%	▯	▯	▯			▯	▯	▯			▯	▯	▯		
Electric resistance															
ASHP					▯ ▯					▯ ▯					▯ ▯
Cost and performance data															
Annual modelled GHG	33699	7498	7004		2361 1798	25340	7019	6694		1875 1485	21816	6818	6560		1672 1351
Annual modelled GHGI	20.4	4.5	4.2		1.4 1.1	15.3	4.2	4		1.1 0.9	13.2	4.1	4		1 0.8
Annual modelled utility cost ($/m²)	7.6	9.1	7.2		9.2 7.1	6.3	7.3	6		7.4 5.9	5.7	6.5	5.5		6.6 3.5
Annual modelled utility cost increase vs. base case (%)	0	19.7%	-5.3%		21.1% -6.6%	0	15.9%	-4.8%		17.5% -6.3%	0%	14.0%	-3.5%		15.8% -38.6%
Total ICC vs. base case ($/m²)	0	1.8	30.4		8.8 37.4	0	2	30		8.8 37.4	0	1.8	30.4		8.8 37.4
% ICC vs base case	0%	0.1%	0.8%		0.3% 1.0%	0%	0.1%	0.8%		0.3% 1.0%	0%	0.1%	0.8%		0.3% 1.0%